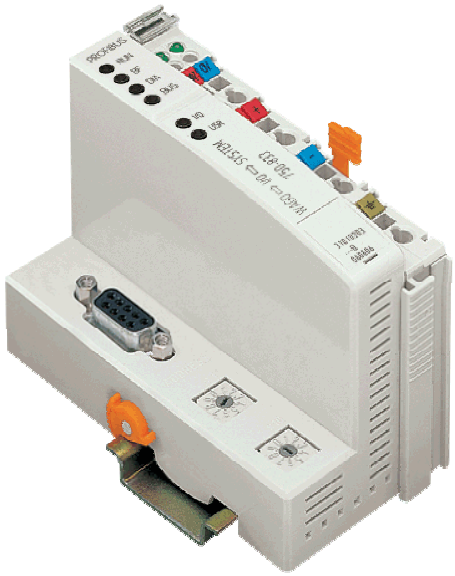
WAGO I/O SYSTEM 750

Modular I/O-System

PROFIBUS DP/V1

Programmable Field Bus Controller 750-833



Manual

Technical description,
installation and
configuration

Version 1.0.1

WAGO®
INNOVATIVE CONNECTIONS

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded we would appreciate any information or ideas at any time.

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We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally trademark or patent protected.

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1 Important Notes

This section provides only a summary of the most important safety requirements and notes which will be mentioned in the individual sections. To protect your health and prevent damage to the devices, it is essential to read and carefully follow the safety guidelines.

1.1 Legal Principles

1.1.1 Copyright

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All rights developing from the issue of a patent or the legal protection of utility patents are reserved to WAGO Kontakttechnik GmbH & Co. KG.
Third-party products are always indicated without any notes concerning patent rights. Thus, the existence of such rights must not be excluded.

1.1.2 Personnel Qualification

The use of the product described in this manual requires special qualifications, as shown in the following table:

Activity	Electrical specialist	Instructed personnel*)	Specialists**) having qualifications in PLC programming
Assembly	X	X	
Commissioning	X		X
Programming			X
Maintenance	X	X	
Troubleshooting	X		
Disassembly	X	X	

*) Instructed persons have been trained by qualified personnel or electrical specialists.

**) A specialist is someone who, through technical training, knowledge and experience, demonstrates the ability to meet the relevant specifications and identify potential dangers in the mentioned field of activity.

All personnel must be familiar with the applicable standards.
WAGO Kontakttechnik GmbH & Co. KG declines any liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this manual.

1.1.3 Conforming Use of Series 750

The couplers and controllers of the modular I/O System 750 receive digital and analog signals from the I/O modules and sensors and transmit them to the actuators or higher level control systems. Using the WAGO controllers, the signals can also be (pre-)processed.

The device is designed for IP20 protection class. It is protected against finger touch and solid impurities up to 12.5mm diameter, but not against water penetration. Unless otherwise specified, the device must not be operated in wet and dusty environments.

1.1.4 Technical Condition of the Devices

For each individual application, the components are supplied from the factory with a dedicated hardware and software configuration. Changes in hardware, software and firmware are only admitted within the framework of the possibilities documented in the manuals. All changes to the hardware or software and the non-conforming use of the components entail the exclusion of liability on the part of WAGO Kontakttechnik GmbH & Co. KG.
Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH & Co. KG.

1.2 Standards and Regulations for Operating the 750 Series

Please observe the standards and regulations that are relevant to your installation:

- The data and power lines must be connected and installed in compliance with the standards to avoid failures on your installation and eliminate any danger to personnel.
- For installation, startup, maintenance and repair, please observe the accident prevention regulations of your machine (e.g. BGV A 3, "Electrical Installations and Equipment").
- Emergency stop functions and equipment must not be made ineffective. See relevant standards (e.g. DIN EN 418).
- Your installation must be equipped in accordance to the EMC guidelines so that electromagnetic interferences can be eliminated.
- Operating 750 Series components in home applications without further measures is only permitted if they meet the emission limits (emissions of interference) according to EN 61000-6-3. You will find the relevant information in the section on "WAGO-I/O-SYSTEM 750" → "System Description" → "Technical Data".
- Please observe the safety measures against electrostatic discharge according to DIN EN 61340-5-1/-3. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded.
- The relevant valid and applicable standards and guidelines concerning the installation of switch cabinets are to be observed.

1.3 Symbols

Danger
Always observe this information to protect persons from injury.

Warning
Always observe this information to prevent damage to the device.

Attention
Marginal conditions that must always be observed to ensure smooth and efficient operation.

ESD (Electrostatic Discharge)
Warning of damage to the components through electrostatic discharge. Observe the precautionary measure for handling components at risk of electrostatic discharge.

Note
Make important notes that are to be complied with so that a trouble-free and efficient device operation can be guaranteed.

Additional Information
References to additional literature, manuals, data sheets and internet pages.

1.4 Safety Information

When connecting the device to your installation and during operation, the following safety notes must be observed:

Danger
The WAGO-I/O-SYSTEM 750 and its components are an open system. It must only be assembled in housings, cabinets or in electrical operation rooms. Access is only permitted via a key or tool to authorized qualified personnel.

Danger
All power sources to the device must always be switched off before carrying out any installation, repair or maintenance work.

Warning
Replace defective or damaged device/module (e.g. in the event of deformed contacts), as the functionality of field bus station in question can no longer be ensured on a long-term basis.

Warning
The components are not resistant against materials having seeping and insulating properties. Belonging to this group of materials is: e.g. aerosols, silicones, triglycerides (found in some hand creams). If it cannot be ruled out that these materials appear in the component environment, then the components must be installed in an enclosure that is resistant against the above mentioned materials. Clean tools and materials are generally required to operate the device/module.

Warning
Soiled contacts must be cleaned using oil-free compressed air or with ethyl alcohol and leather cloths.

Warning
Do not use contact sprays, which could possibly impair the functioning of the contact area.

Warning
Avoid reverse polarity of data and power lines, as this may damage the devices.

ESD (Electrostatic Discharge)
The devices are equipped with electronic components that may be destroyed by electrostatic discharge when touched.

1.5 Font Conventions

italic	Names of paths and files are marked in italic. e.g.: *C:\Programs\WAGO-IO-CHECK*
italic	Menu items are marked in bold italic. e.g.: ***Save***
\	A backslash between two names characterizes the selection of a menu point from a menu. e.g.: ***File \ New***
END	Press buttons are marked as bold with small capitals e.g.: **ENTER**
< >	Keys are marked bold within angle brackets e.g.: **<F5>**
`Courier`	The print font for program codes is Courier. e.g.: `END_VAR`

1.6 Number Notation

Number code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	Within inverted commas, Nibble separated with dots

1.7 Scope

This manual describes all components of the field bus independent WAGO I/O SYSTEM 750 with programmable field bus controller.

Item No.	Description
750-833	Programmable Field Bus Controller PROFIBUS DP/V1 12 MBd

1.8 Abbreviation

AI	Analog Input Analog Input Module
AO	Analog Output Analog Output Module
CPU	In this case the Run Time System for the eradication of the user program in the PFC
DI	Digital Input Digital Input Module
DO	Digital Output Digital Output Module
FBD	Function Block Diagram
HB	High Byte
I/O	Input/Output
IL	Instruction List
ID	Identifier
LB	Low Byte
LD	Ladder Diagram
PFC	Programmalbe Field Bus Controller
PLC	Programmable Logic Controller
SFC	Sequential Function Chart
ST	Structured Text
SW	Software Version

2 The WAGO-I/O-SYSTEM 750

2.1 System Description

The WAGO-I/O-SYSTEM 750 is a modular, field bus independent I/O system. It is comprised of a field bus coupler/controller (1) and connected field bus modules (2) for any type of signal. Together, these make up the field bus node. The end module (3) completes the node.

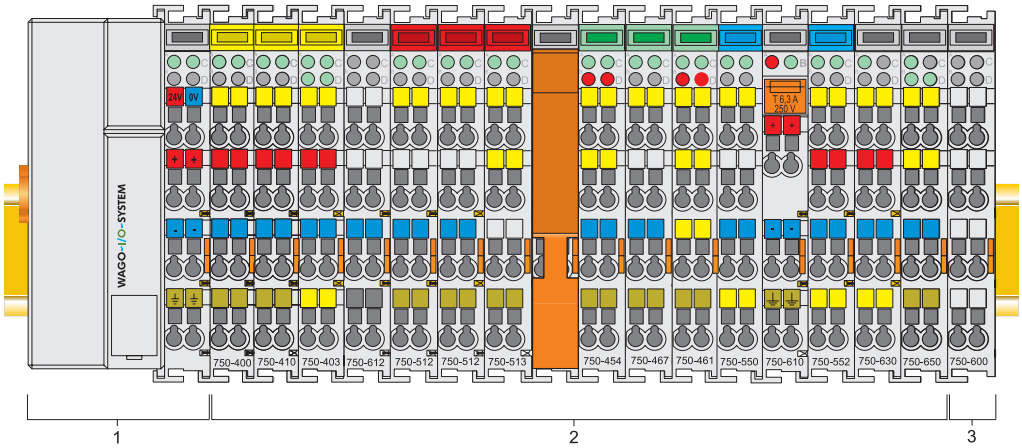


Fig. 2-1: Field bus node g0xxx00x

Couplers/controllers for field bus systems such as PROFIBUS, INTERBUS, ETHERNET TCP/IP, CAN (CANopen, DeviceNet, CAL), MODBUS, LON and others are available.

The coupler/controller contains the field bus interface, electronics and a power supply terminal. The field bus interface forms the physical interface to the relevant field bus. The electronics process the data of the bus modules and make it available for the field bus communication. The 24 V system supply and the 24 V field supply are fed in via the integrated power supply terminal. The field bus coupler communicates via the relevant field bus. The programmable field bus controller (PFC) enables the implementation of additional PLC functions. Programming is done with the **WAGO-I/O-*PRO*** in accordance with IEC 61131-3.

Bus modules for diverse digital and analog I/O functions as well as special functions can be connected to the coupler/controller. The communication between the coupler/controller and the bus modules is carried out via an internal bus.

The WAGO-I/O-SYSTEM 750 has a clear port level with LEDs for status indication, insertable mini WSB markers and pullout group marker carriers. The 3-wire technology supplemented by a ground wire connection allows for direct sensor/actuator wiring.

2.2 Technical Data

Mechanic	
Material	Polycarbonate, Polyamide 6.6
Dimensions W x H* x L * from upper edge of DIN 35 rail - Coupler/Controller (Standard) - Coupler/Controller (ECO) - Coupler/Controller (FireWire) - I/O module, single - I/O module, double - I/O module, fourfold	 - 51 mm x 65 mm x 100 mm - 50 mm x 65 mm x 100 mm - 62 mm x 65 mm x 100 mm - 12 mm x 64 mm x 100 mm - 24 mm x 64 mm x 100 mm - 48 mm x 64 mm x 100 mm
Installation	on DIN 35 with interlock
Modular by	double featherkey-dovetail
Mounting position	any position
Marking	standard marking label type group marking label 8 x 47 mm
Connection	
Connection type	CAGE CLAMP®
Wire range	0.08 mm² ... 2.5 mm², AWG 28-14
Stripped length	8 … 9 mm, 9 … 10 mm for components with pluggable wiring (753-xxx)
Contacts	
Power jumpers contacts	blade/spring contact self-cleaning
Current via power contacts $_{max}$	10 A
Voltage drop at I $_{max}$	< 1 V/64 modules
Data contacts	slide contact, hard gold plated 1.5 µm, self-cleaning
Climatic environmental conditions	
Operating temperature	0 °C ... 55 °C, -20 °C … +60 °C for components with extended temperature range (750-xxx/025-xxx)
Storage temperature	-20 °C ... +85 °C
Relative humidity	5 % … 95 % without condensation
Resistance to harmful substances	acc. to IEC 60068-2-42 and IEC 60068-2-43
Maximum pollutant concentration at relative humidity < 75%	$SO_2 \leq 25$ ppm $H_2S \leq 10$ ppm
Special conditions	Ensure that additional measures for components are taken, which are used in an environment involving: – dust, caustic vapors or gases – ionization radiation

Safe electrical isolation				
Air and creepage distance	acc. to IEC 60664-1			
Degree of pollution acc. To IEC 61131-2	2			
Degree of protection				
Degree of protection	IP 20			
Electromagnetic compatibility				
Immunity to interference for industrial areas acc. to EN 61000-6-2 (2001)				
Test specification	**Test values**		**Strength class**	**Evaluation criteria**
EN 61000-4-2 ESD	4 kV/8 kV (contact/air)		2/3	B
EN 61000-4-3 electromagnetic fields	10 V/m 80 MHz ... 1 GHz		3	A
EN 61000-4-4 burst	1 kV/2 kV (data/supply)		2/3	B
EN 61000-4-5 surge	Data:	-/- (line/line)		B
		1 kV (line/earth)	2	
	DC supply:	0.5 kV (line/line)	1	B
		0.5 kV (line/earth)	1	
	AC supply:	1 kV (line/line)	2	B
		2 kV (line/earth)	3	
EN 61000-4-6 RF disturbances	10 V/m 80 % AM (0.15 ... 80 MHz)		3	A
Emission of interference for industrial areas acc. to EN 61000-6-4 (2001)				
Test specification	**Limit values/[QP]*)**		**Frequency range**	**Distance**
EN 55011 (AC supply, conducted)	79 dB (µV)		150 kHz ... 500 kHz	
	73 dB (µV)		500 kHz ... 30 MHz	
EN 55011 (radiated)	40 dB (µV/m)		30 MHz ... 230 MHz	10 m
	47 dB (µV/m)		230 MHz ... 1 GHz	10 m
Emission of interference for residential areas acc. to EN 61000-6-3 (2001)				
Test specification	**Limit values/[QP]*)**		**Frequency range**	**Distance**
EN 55022 (AC supply, conducted)	66 ... 56 dB (µV)		150 kHz ... 500 kHz	
	56 dB (µV)		500 kHz ... 5 MHz	
	60 dB (µV)		5 MHz ... 30 MHz	
EN 55022 (DC supply/data, conducted)	40 ... 30 dB (µA)		150 kHz ... 500 kHz	
	30 dB (µA)		500 kHz ... 30 MHz	
EN 55022 (radiated)	30 dB (µV/m)		30 MHz ... 230 MHz	10 m
	37 dB (µV/m)		230 MHz ... 1 GHz	10 m

Mechanical strength acc. to IEC 61131-2		
Test specification	**Frequency range**	**Limit value**
IEC 60068-2-6 vibration	5 Hz ≤ f < 9 Hz	1.75 mm amplitude (permanent) 3.5 mm amplitude (short term)
	9 Hz ≤ f < 150 Hz	0.5 g (permanent) 1 g (short term)
	Note on vibration test: a) Frequency change: max. 1 octave/minute b) Vibration direction: 3 axes	
IEC 60068-2-27 shock		15 g
	Note on shock test: a) Type of shock: half sine b) Shock duration: 11 ms c) Shock direction: 3x in positive and 3x in negative direction for each of the three mutually perpendicular axes of the test specimen	
IEC 60068-2-32 free fall		1 m (module in original packing)

*) QP: Quasi Peak

Note
If the technical data of components differ from the values described here, the technical data shown in the manuals of the respective components shall be valid.

For Products of the WAGO-I/O-SYSTEM 750 with ship specific approvals supplementary guidelines are valid:

Electromagnetic compatibility				
Immunity to interference acc. to Germanischer Lloyd (2003)				
Test specification	**Test values**		**Strength class**	**Evaluation criteria**
IEC 61000-4-2 ESD	6 kV/8 kV (contact/air)		3/3	B
IEC 61000-4-3 electromagnetic fields	10 V/m 80 MHz ... 2 GHz		3	A
IEC 61000-4-4 burst	1 kV/2 kV (data/supply)		2/3	A
IEC 61000-4-5 surge	AC/DC Supply:	0.5 kV (line/line)	1	A
		1 kV (line/earth)	2	
IEC 61000-4-6 RF disturbances	10 V/m 80 % AM (0.15 ... 80 MHz)		3	A
Type test AF disturbances (harmonic waves)	3 V, 2 W		-	A
Type test high voltage	755 V DC 1500 V AC		-	-

Emission of interference acc. to Germanischer Lloyd (2003)			
Test specification	**Limit values**	**Frequency range**	**Distance**
Type test (EMC1, conducted) allows for ship bridge control applications	96 ... 50 dB (µV)	10 kHz ... 150 kHz	
	60 ... 50 dB (µV)	150 kHz ... 350 kHz	
	50 dB (µV)	350 kHz ... 30 MHz	
Type test (EMC1, radiated) allows for ship bridge control applications	80 ... 52 dB (µV/m)	150 kHz ... 300 kHz	3 m
	52 ... 34 dB (µV/m)	300 kHz ... 30 MHz	3 m
	54 dB (µV/m)	30 MHz ... 2 GHz	3 m
except:	24 dB (µV/m)	156 MHz ... 165 MHz	3 m

Mechanical strength acc. to Germanischer Lloyd (2003)		
Test specification	**Frequency range**	**Limit value**
IEC 60068-2-6 vibration (category A – D)	2 Hz ≤ f < 25 Hz	± 1.6 mm amplitude (permanent)
	25 Hz ≤ f < 100 Hz	4 g (permanent)
	Note on vibration test: a) Frequency change: max. 1 octave/minute b) Vibration direction: 3 axes	

Range of application	Required specification emission of interference	Required specification immunity to interference
Industrial areas	EN 61000-6-4 (2001)	EN 61000-6-2 (2001)
Residential areas	EN 61000-6-3 (2001)*)	EN 61000-6-1 (2001)

*) The system meets the requirements on emission of interference in residential areas with the field bus coupler/controller for:

ETHERNET	750-342/-841/-842/-860
LonWorks	750-319/-819
CANopen	750-337/-837
DeviceNet	750-306/-806
MODBUS	750-312/-314/ -315/ -316 750-812/-814/ -815/ -816

With a special permit, the system can also be implemented with other field bus couplers/controllers in residential areas (housing, commercial and business areas, small-scale enterprises). The special permit can be obtained from an authority or inspection office. In Germany, the Federal Office for Post and Telecommunications and its branch offices issues the permit.

It is possible to use other field bus couplers/controllers under certain boundary conditions. Please contact WAGO Kontakttechnik GmbH & Co. KG.

Maximum power dissipation of the components	
Bus modules	0.8 W / bus terminal (total power dissipation, system/field)
Field bus coupler/controller	2.0 W / coupler/controller

Warning

The power dissipation of all installed components must not exceed the maximum conductible power of the housing (cabinet).

When dimensioning the housing, care is to be taken that even under high external temperatures, the temperature inside the housing does not exceed the permissible ambient temperature of 55 °C.

Dimensions

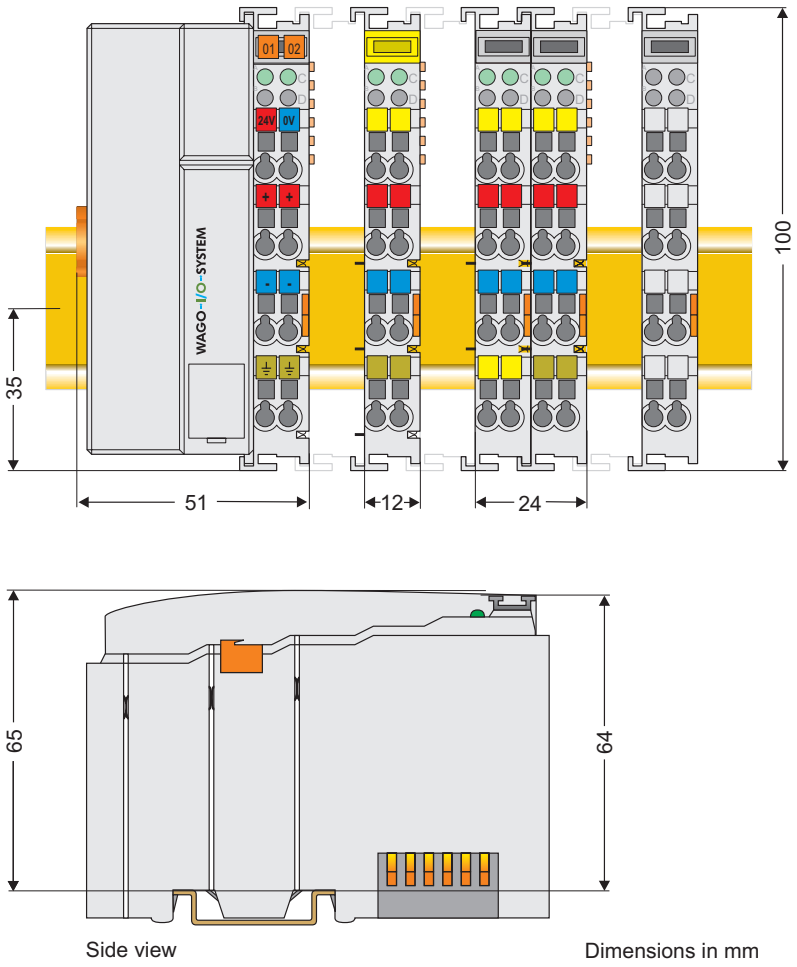


Fig. 2-2: Dimensions

g01xx05e

Note

The illustration shows a standard coupler. For detailed dimensions, please refer to the technical data of the respective coupler/controller.

2.3 Manufacturing Number

The manufacturing number indicates the delivery status directly after production.
This number is part of the lateral marking on the component.
In addition, starting from calendar week 43/2000 the manufacturing number is also printed on the cover of the configuration and programming interface of the field bus coupler or controller.

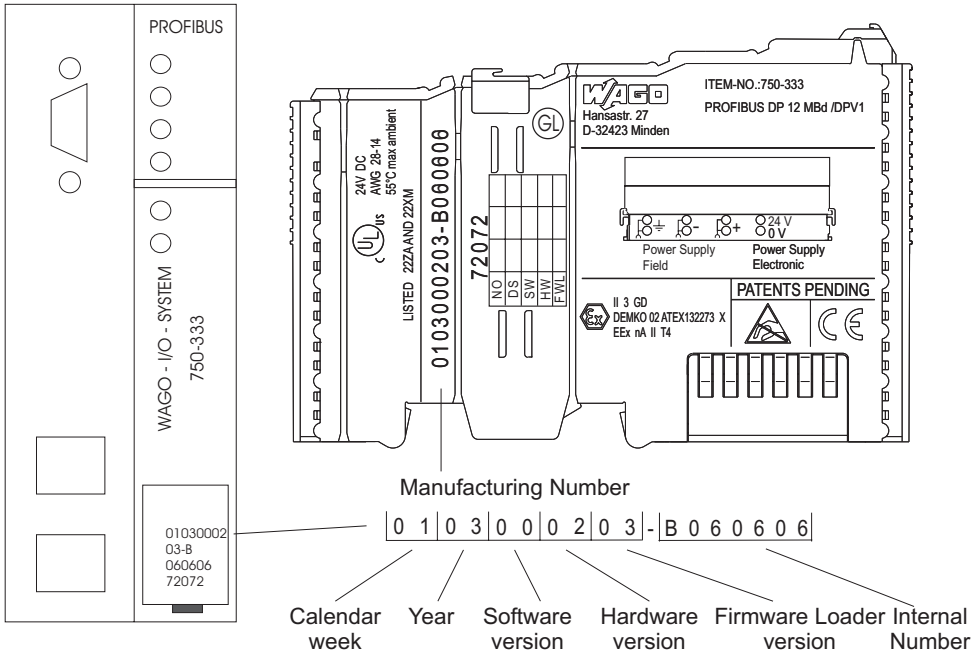


Fig. 2-3: Example: Manufacturing Number of a PROFIBUS field bus coupler 750-333

g01xx15e

The manufacturing number consists of the production week and year, the software version (if available), the hardware version of the component, the firmware loader (if available) and further internal information for WAGO Kontakttechnik GmbH & Co. KG.

2.4 Component Update

For the case of an Update of one component, the lateral marking on each component contains a prepared matrix .

This matrix makes columns available for altogether three updates to the entry of the current update data, like production order number (NO; starting from calendar week 13/2004), update date (DS), software version (SW), hardware version (HW) and the firmware loader version (FWL, if available).

Update Matrix

Current Version data for:		1. Update	2. Update	3. Update	
Production Order Number	**NO**				← only starting from calendar week 13/2004
Datestamp	**DS**				
Software index	**SW**				
Hardware index	**HW**				
Firmware loader index	**FWL**				← only for coupler/ controller

If the update of a component took place, the current version data are registered into the columns of the matrix.

Additionally with the update of a field bus coupler or controller also the cover of the configuration and programming interface of the coupler or controller is printed on with the current manufacturing and production order number.

The original manufacturing data on the housing of the component remain thereby.

2.5 Storage, Assembly and Transport

Wherever possible, the components are to be stored in their original packaging. Likewise, the original packaging provides optimal protection during transport.

When assembling or repacking the components, the contacts must not be soiled or damaged. The components must be stored and transported in appropriate containers/packaging. Thereby, the ESD information is to be regarded.

Statically shielded transport bags with metal coatings are to be used for the transport of open components for which soiling with amine, amide and silicone has been ruled out, e.g. 3M 1900E.

2.6 Mechanical Setup

2.6.1 Installation Position

Along with horizontal and vertical installation, all other installation positions are allowed.

Attention
In the case of vertical assembly, an end stop has to be mounted as an additional safeguard against slipping.

WAGO item 249-116	End stop for DIN 35 rail, 6 mm wide
WAGO item 249-117	End stop for DIN 35 rail, 10 mm wide

2.6.2 Total Expansion

The length of the module assembly (including one end module of 12mm width) that can be connected to the coupler/controller is 780 mm. When assembled, the I/O modules have a maximum length of 768 mm.

Examples:

- 64 I/O modules of 12 mm width can be connected to one coupler/controller.
- 32 I/O modules of 24 mm width can be connected to one coupler/controller.

Exception:

The number of connected I/O modules also depends on which type of coupler/controller is used. For example, the maximum number of I/O modules that can be connected to a PROFIBUS coupler/controller is 63 without end module. The maximum total expansion of a node is calculated as follows:

Warning
The maximum total length of a node without coupler/controller must not exceed 780 mm. Furthermore, restrictions made on certain types of couplers/controllers must be observed (e.g. for PROFIBUS).

2.6.3 Assembly onto Carrier Rail

2.6.3.1 Carrier Rail Properties

All system components can be snapped directly onto a carrier rail in accordance with the European standard EN 50022 (DIN 35).

Warning
WAGO Kontakttechnik GmbH & Co. KG supplies standardized carrier rails that are optimal for use with the I/O system. If other carrier rails are used, then a technical inspection and approval of the rail by WAGO Kontakttechnik GmbH & Co. KG should take place.

Carrier rails have different mechanical and electrical properties. For the optimal system setup on a carrier rail, certain guidelines must be observed:

- The material must be non-corrosive.
- Most components have a contact to the carrier rail to ground electro-magnetic disturbances. In order to avoid corrosion, this tin-plated carrier rail contact must not form a galvanic cell with the material of the carrier rail which generates a differential voltage above 0.5 V (saline solution of 0.3% at 20°C) .
- The carrier rail must optimally support the EMC measures integrated into the system and the shielding of the bus module connections.
- A sufficiently stable carrier rail should be selected and, if necessary, several mounting points (every 20 cm) should be used in order to prevent bending and twisting (torsion).
- The geometry of the carrier rail must not be altered in order to secure the safe hold of the components. In particular, when shortening or mounting the carrier rail, it must not be crushed or bent.
- The base of the I/O components extends into the profile of the carrier rail. For carrier rails with a height of 7.5 mm, mounting points are to be riveted under the node in the carrier rail (slotted head captive screws or blind rivets).

2.6.3.2 WAGO DIN Rail

WAGO carrier rails meet the electrical and mechanical requirements.

Item Number	Description
210-113 /-112	35 x 7.5; 1 mm; steel yellow chromated; slotted/unslotted
210-114 /-197	35 x 15; 1.5 mm; steel yellow chromated; slotted/unslotted
210-118	35 x 15; 2.3 mm; steel yellow chromated; unslotted
210-198	35 x 15; 2.3 mm; copper; unslotted
210-196	35 x 7.5; 1 mm; aluminum; unslotted

2.6.4 Spacing

The spacing between adjacent components, cable conduits, casing and frame sides must be maintained for the complete field bus node.

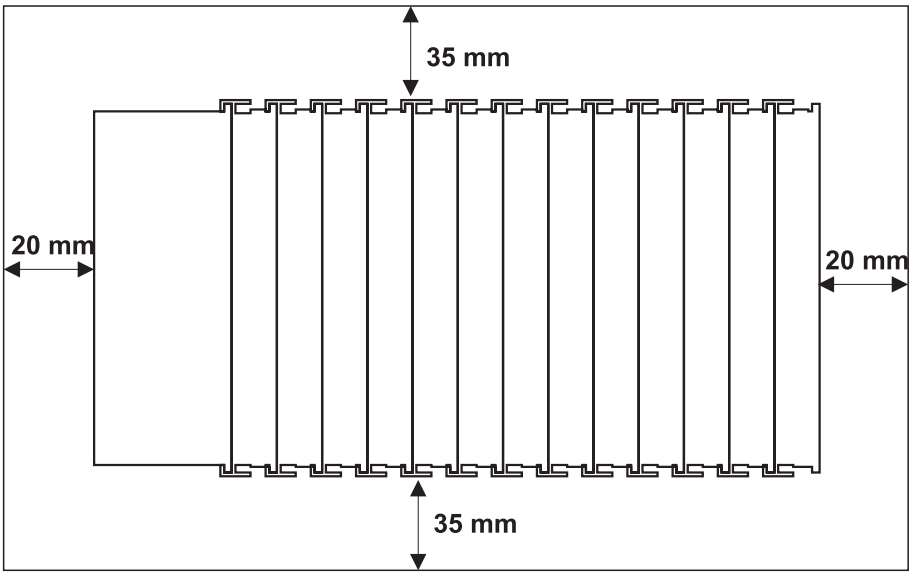


Fig. 2-4: Spacing g01xx13x

The spacing creates room for heat transfer, installation or wiring. The spacing to cable conduits also prevents conducted electromagnetic interferences from influencing the operation.

2.6.5 Plugging and Removal of the Components

Warning
Before work is done on the components, the voltage supply must be turned off.

In order to safeguard the coupler/controller from jamming, it should be fixed onto the carrier rail with the locking disc To do so, push on the upper groove of the locking disc using a screwdriver.

To pull out the field bus coupler/controller, release the locking disc by pressing on the bottom groove with a screwdriver and then pulling the orange colored unlocking lug .

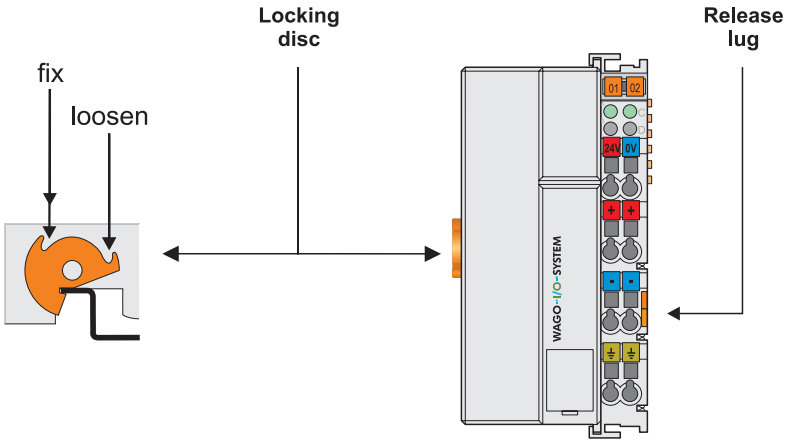


Fig. 2-5: Coupler/Controller and unlocking lug g01xx12e

It is also possible to release an individual I/O module from the unit by pulling an unlocking lug.

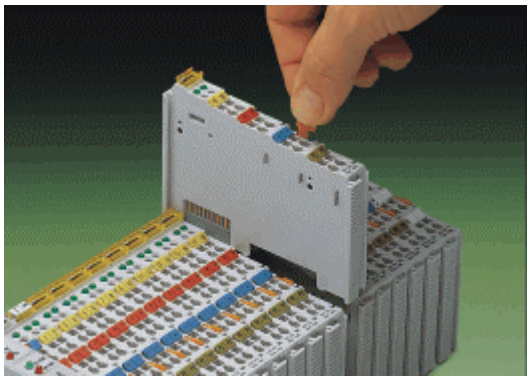


Fig. 2-6: removing bus terminal p0xxx01x

Danger
Ensure that an interruption of the PE will not result in a condition which could endanger a person or equipment!
For planning the ring feeding of the ground wire, please see chapter 2.6.3.

2.6.6 Assembly Sequence

All system components can be snapped directly on a carrier rail in accordance with the European standard EN 50022 (DIN 35).

The reliable positioning and connection is made using a tongue and groove system. Due to the automatic locking, the individual components are securely seated on the rail after installing.

Starting with the coupler/controller, the bus modules are assembled adjacent to each other according to the project planning. Errors in the planning of the node in terms of the potential groups (connection via the power contacts) are recognized, as the bus modules with power contacts (male contacts) cannot be linked to bus modules with fewer power contacts.

Attention
Always link the bus modules with the coupler/controller, and always plug from above.

Warning
Never plug bus modules from the direction of the end terminal. A ground wire power contact, which is inserted into a terminal without contacts, e.g. a 4-channel digital input module, has a decreased air and creepage distance to the neighboring contact in the example DI4.

Always terminate the field bus node with an end module (750-600).

2.6.7 Internal Bus/Data Contacts

Communication between the coupler/controller and the bus modules as well as the system supply of the bus modules is carried out via the internal bus. It is comprised of 6 data contacts, which are available as self-cleaning gold spring contacts.

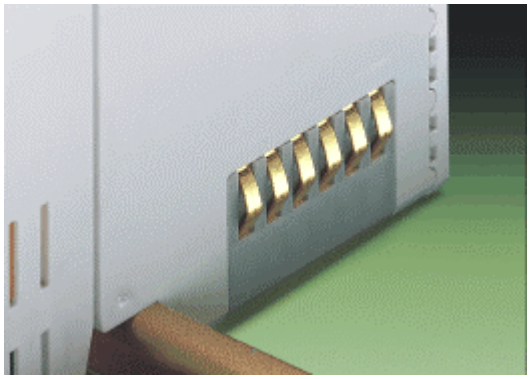


Fig. 2-7: Data contacts p0xxx07x

Warning
Do not touch the gold spring contacts on the I/O modules in order to avoid soiling or scratching!

ESD (Electrostatic Discharge)
The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, e.g. data contacts.

2.6.8 Power Contacts

Self-cleaning power contacts , are situated on the side of the components which further conduct the supply voltage for the field side. These contacts come as touchproof spring contacts on the right side of the coupler/controller and the bus module. As fitting counterparts the module has male contacts on the left side.

Danger
The power contacts are sharp-edged. Handle the module carefully to prevent injury.

Attention
Please take into consideration that some bus modules have no or only a few power jumper contacts. The design of some modules does not allow them to be physically assembled in rows, as the grooves for the male contacts are closed at the top.

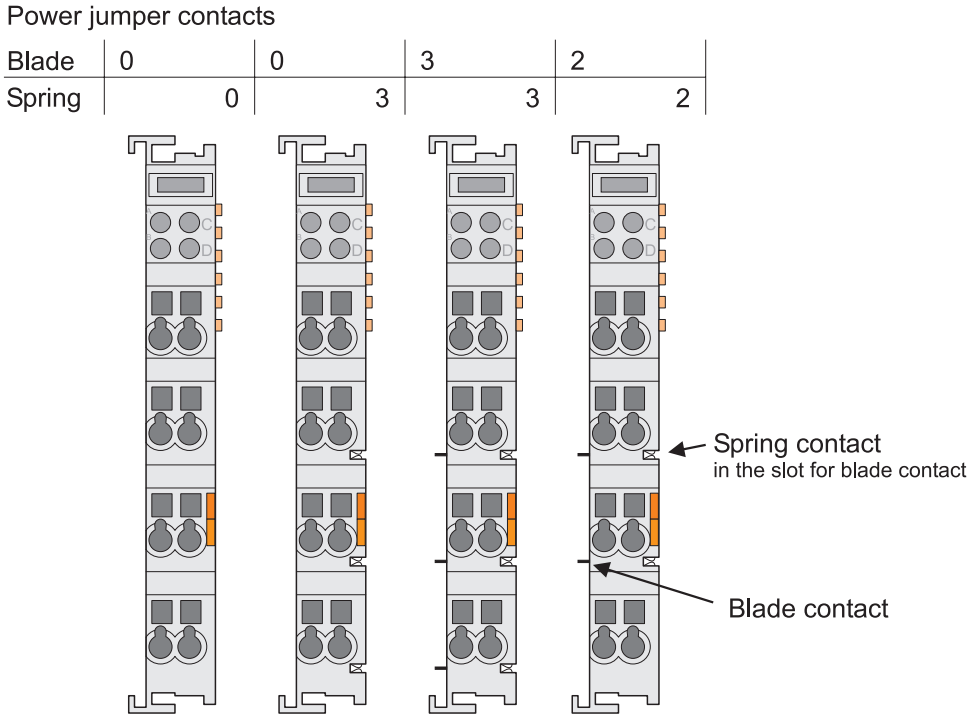


Fig. 2-8: Example for the arrangement of power contacts g0xxx05e

Recommendation
With the WAGO ProServe® Software smartDESIGNER, the structure of a field bus node can be configured. The configuration can be tested via the integrated accuracy check.

2.6.9 Wire Connection

All components have CAGE CLAMP® connections.

The WAGO CAGE CLAMP® connection is appropriate for solid, stranded and finely stranded conductors. Each clamping unit accommodates one conductor.

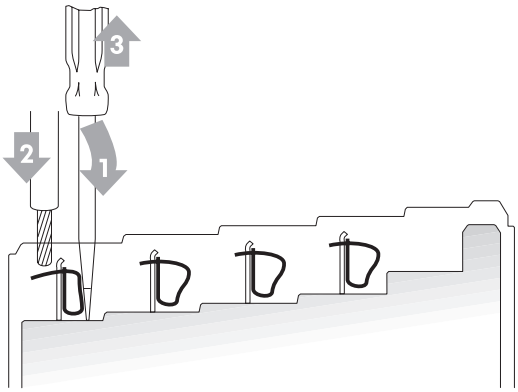


Fig. 2-9: CAGE CLAMP® Connection g0xxx08x

The operating tool is inserted into the opening above the connection. This opens the CAGE CLAMP®. Subsequently the conductor can be inserted into the opening. After removing the operating tool, the conductor is safely clamped.

More than one conductor per connection is not permissible. If several conductors have to be made at one connection point, then they should be made away from the connection point using WAGO Terminal Blocks. The terminal blocks may be jumpered together and a single wire brought back to the I/O module connection point.

Attention
If it is unavoidable to jointly connect 2 conductors, then a ferrule must be used to join the wires together.
Ferrule:

Length	8 mm
Nominal cross section $_{max.}$	1 mm^2 for 2 conductors with 0.5 mm^2 each
WAGO Product	216-103 or products with comparable properties

2.7 Power Supply

2.7.1 Isolation

Within the field bus node, there are three electrically isolated potentials.

- Operational voltage for the field bus interface.
- Electronics of the couplers/controllers and the bus modules (internal bus).
- All bus modules have an electrical isolation between the electronics (internal bus, logic) and the field electronics. Some digital and analog input modules have each channel electrically isolated, please see catalog.

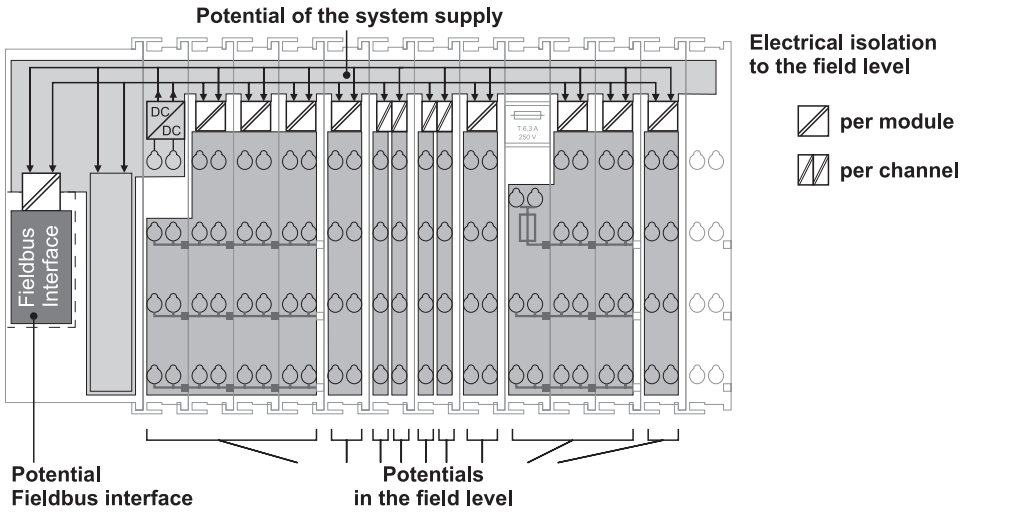


Fig. 2-10: Isolation g0xxx01e

Attention

The ground wire connection must be present in each group. In order that all protective conductor functions are maintained under all circumstances, it is recommended that a ground wire be connected at the beginning and end of a potential group. (ring format, please see chapter 2.8.3). Thus, if a bus module comes loose from a composite during servicing, then the protective conductor connection is still guaranteed for all connected field devices.

When using a joint power supply unit for the 24 V system supply and the 24 V field supply, the electrical isolation between the internal bus and the field level is eliminated for the potential group.

2.7.2 System Supply

2.7.2.1 Connection

The WAGO-I/O-SYSTEM 750 requires a 24 V direct current system supply (-15 % or +20 %). The power supply is provided via the coupler/controller and, if necessary, in addition via the internal system supply modules (750-613). The voltage supply is reverse voltage protected.

Attention
The use of an incorrect supply voltage or frequency can cause severe damage to the component.

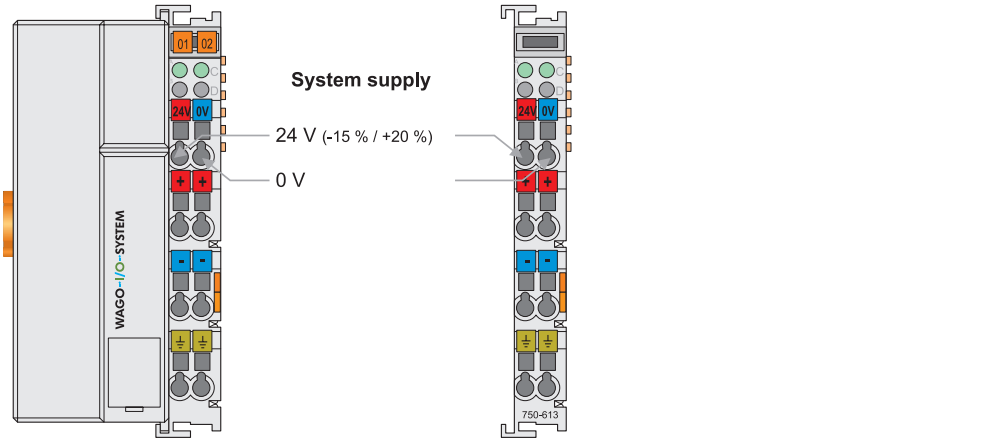


Fig. 2-11: System Supply g0xxx02e

The direct current supplies all internal system components, e.g. coupler/controller electronics, field bus interface and bus modules via the internal bus (5 V system voltage). The 5 V system voltage is electrically connected to the 24 V system supply.

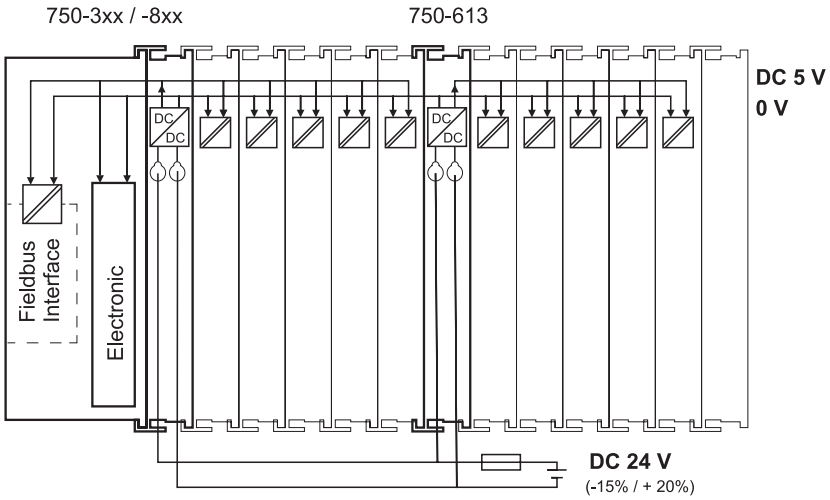


Fig. 2-12: System Voltage g0xxx06e

Attention
Resetting the system by switching on and off the system supply, must take place simultaneously for all supply modules (coupler/controller and 750-613).

2.7.2.2 Alignment

Recommendation
A stable network supply cannot be taken for granted always and everywhere. Therefore, regulated power supply units should be used in order to guarantee the quality of the supply voltage.

The supply capacity of the coupler/controller or the internal system supply module (750-613) can be taken from the technical data of the components.

Internal current consumption[*)]	Current consumption via system voltage: 5 V for electronics of the bus modules and coupler/controller
Residual current for bus terminals[*)]	Available current for the bus modules. Provided by the bus power supply unit. See coupler/controller and internal system supply module (750-613)

[*)] cf. catalogue W4 Volume 3, manuals or internet

Example

Coupler 750-301:
internal current consumption: 350 mA at 5 V
residual current for
bus modules: 1650 mA at 5 V
sum $I_{(5V)\ total}$: 2000 mA at 5 V

The internal current consumption is indicated in the technical data for each bus terminal. In order to determine the overall requirement, add together the values of all bus modules in the node.

Attention
If the *sum of the internal current consumption* exceeds the *residual current for bus modules*, then an internal system supply module (750-613) must be placed before the module where the permissible residual current was exceeded.

Example: A node with a PROFIBUS Coupler 750-333 consists of 20 relay modules (750-517) and 10 digital input modules (750-405).

Current consumption:

20* 90 mA =	1800 mA	
10* 2 mA =		20 mA
Sum	1820 mA	

The coupler can provide 1650 mA for the bus modules. Consequently, an internal system supply module (750-613), e.g. in the middle of the node, should be added.

Recommendation
With the WAGO ProServe® Software smartDESIGNER, the assembly of a field bus node can be configured. The configuration can be tested via the integrated accuracy check.

The maximum input current of the 24 V system supply is 500 mA. The exact electrical consumption ($I_{(24\ V)}$) can be determined with the following formulas:

Coupler/Controller

$I_{(5\ V)\ total}$ = *Sum of all the internal current consumption of the connected bus modules + internal current consumption coupler/controller*

750-613

$I_{(5\ V)\ total}$ = *Sum of all the internal current consumption of the connected bus modules*

Input current $I_{(24\ V)}$ = $5\ V / 24\ V * I_{(5\ V)\ total} / \eta$

$\eta = 0.87$ (at nominal load)

Attention
If the electrical consumption of the power supply point for the 24 V-system supply exceeds 500 mA, then the cause may be an improperly aligned node or a defect.

During the test, all outputs, in particular those of the relay modules, must be active.

2.7.3 Field Supply

2.7.3.1 Connection

Sensors and actuators can be directly connected to the relevant channel of the bus module in 1/4 conductor connection technology. The bus module supplies power to the sensors and actuators. The input and output drivers of some bus modules require the field side supply voltage.

The coupler/controller provides field side power (DC 24V). In this case it is a passive power supply without protection equipment.
Power supply modules are available for other potentials, e. g. AC 230 V. Likewise, with the aid of the power supply modules, various potentials can be set up. The connections are linked in pairs with a power contact.

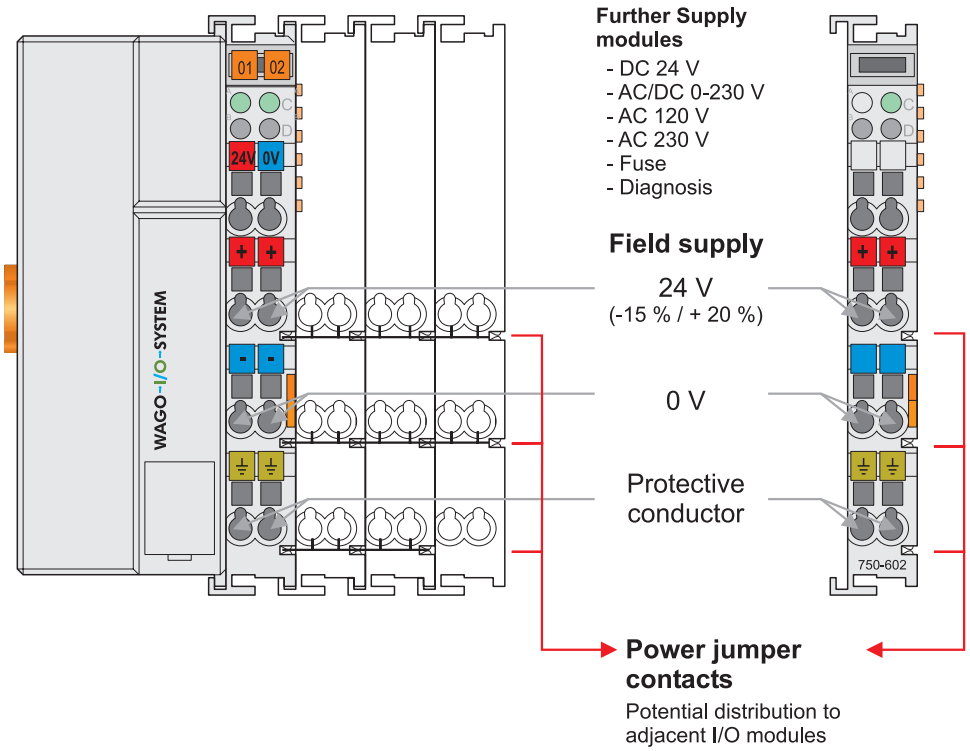


Fig. 2-13: Field Supply (Sensor/Actuator)

The supply voltage for the field side is automatically passed to the next module via the power jumper contacts when assembling the bus modules .

The current load of the power contacts must not exceed 10 A on a continual basis. The current load capacity between two connection terminals is identical to the load capacity of the connection wires.

By inserting an additional power supply module, the field supply via the power contacts is disrupted. From there a new power supply occurs which may also contain a new voltage potential.

Attention
Some bus modules have no or very few power contacts (depending on the I/O function). Due to this, the passing through of the relevant potential is disrupted. If a field supply is required for subsequent bus modules, then a power supply module must be used.
Note the data sheets of the bus modules.

In the case of a node setup with different potentials, e.g. the alteration from DC 24 V to AC 230V, a spacer module should be used. The optical separation of the potentials acts as a warning to heed caution in the case of wiring and maintenance works. Thus, the results of wiring errors can be prevented.

2.7.3.2 Fusing

Internal fusing of the field supply is possible for various field voltages via an appropriate power supply module.

750-601	24 V DC, Supply/Fuse
750-609	230 V AC, Supply/Fuse
750-615	120 V AC, Supply/Fuse
750-610	24 V DC, Supply/Fuse/Diagnosis
750-611	230 V AC, Supply/Fuse/Diagnosis

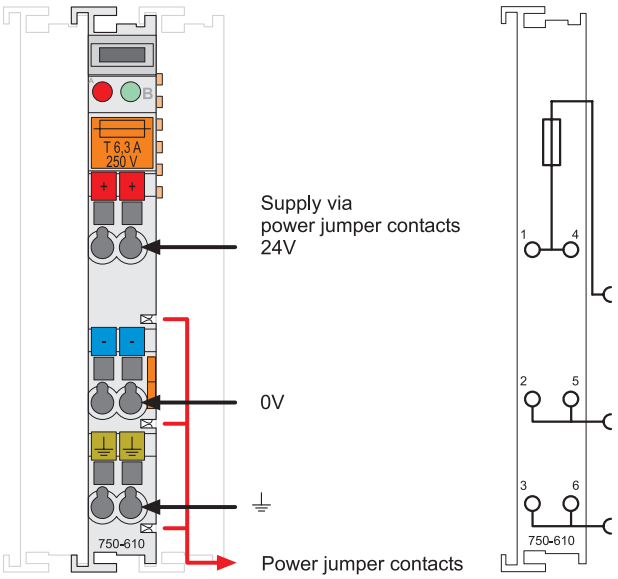


Fig. 2-14: Supply module with fuse carrier (Example 750-610) g0xxx09x

Warning
In the case of power supply modules with fuse holders, only fuses with a maximum dissipation of 1.6 W (IEC 127) must be used.
For UL approved systems only use UL approved fuses.

In order to insert or change a fuse, or to switch off the voltage in succeeding bus modules, the fuse holder may be pulled out. In order to do this, use a screwdriver for example, to reach into one of the slits (one on both sides) and pull out the holder.

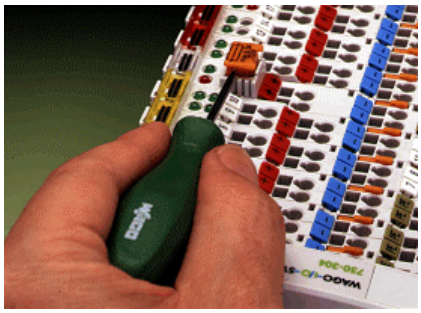


Fig. 2-15: Removing the fuse carrier p0xxx05x

Lifting the cover to the side opens the fuse carrier.

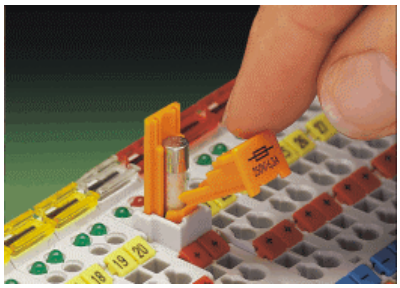


Fig. 2-16: Opening the fuse carrier p0xxx03x

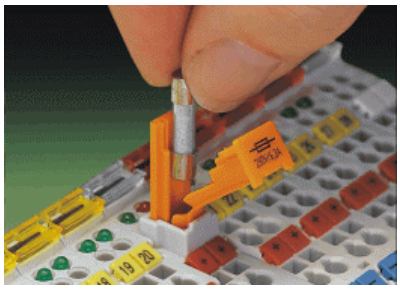


Fig. 2-17: Change fuse p0xxx04x

After changing the fuse, the fuse carrier is pushed back into its original position.

Alternatively, fusing can be done externally. The fuse modules of the WAGO series 281 and 282 are suitable for this purpose.

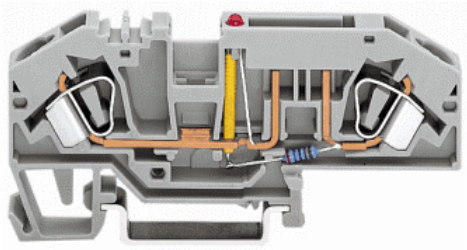


Fig. 2-18: Fuse modules for automotive fuses, series 282 pf66800x

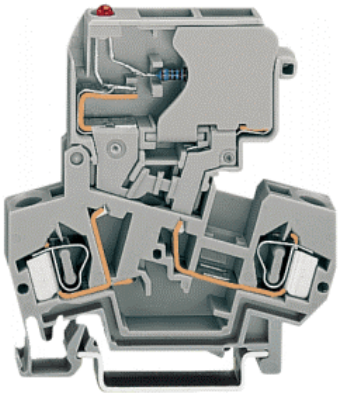


Fig. 2-19: Fuse modules with pivotable fuse carrier, series 281 pe61100x

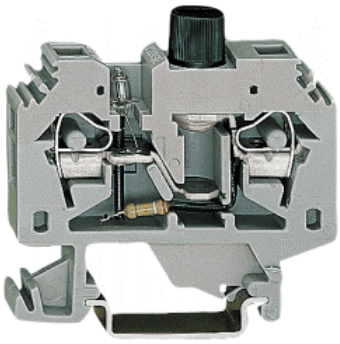


Fig. 2-20: Fuse modules, series 282 pf12400x

2.7.4 Supplementary Power Supply Regulations

The WAGO-I/O-SYSTEM 750 can also be used in shipbuilding or offshore and onshore areas of work (e. g. working platforms, loading plants). This is demonstrated by complying with the standards of influential classification companies such as Germanischer Lloyd and Lloyds Register.

Filter modules for 24-volt supply are required for the certified operation of the system.

Item No.	Name	Description
750-626	Supply filter	Filter module for system supply and field supply (24 V, 0 V), i.e. for field bus coupler/controller and bus power supply (750-613)
750-624	Supply filter	Filter module for the 24 V- field supply (750-602, 750-601, 750-610)

Therefore, the following power supply concept must be absolutely complied with.

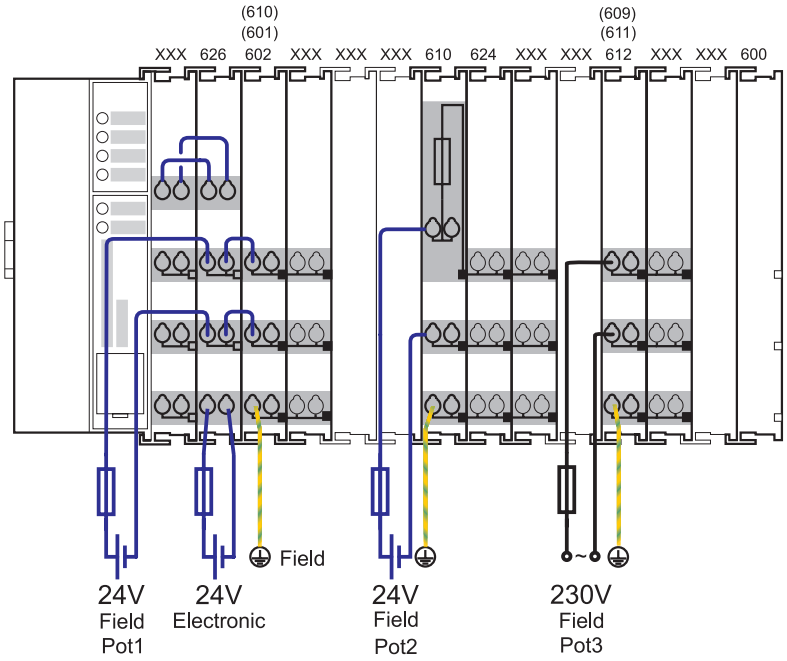


Fig. 2-21: Power supply concept g01xx11e

Note
Another potential power terminal 750-601/602/610 must only be used behind the filter terminal 750-626 if the protective earth conductor is needed on the lower power contact or if a fuse protection is required.

2.7.5 Supply Example

Attention
The system supply and the field supply should be separated in order to ensure bus operation in the event of a short-circuit on the actuator side.

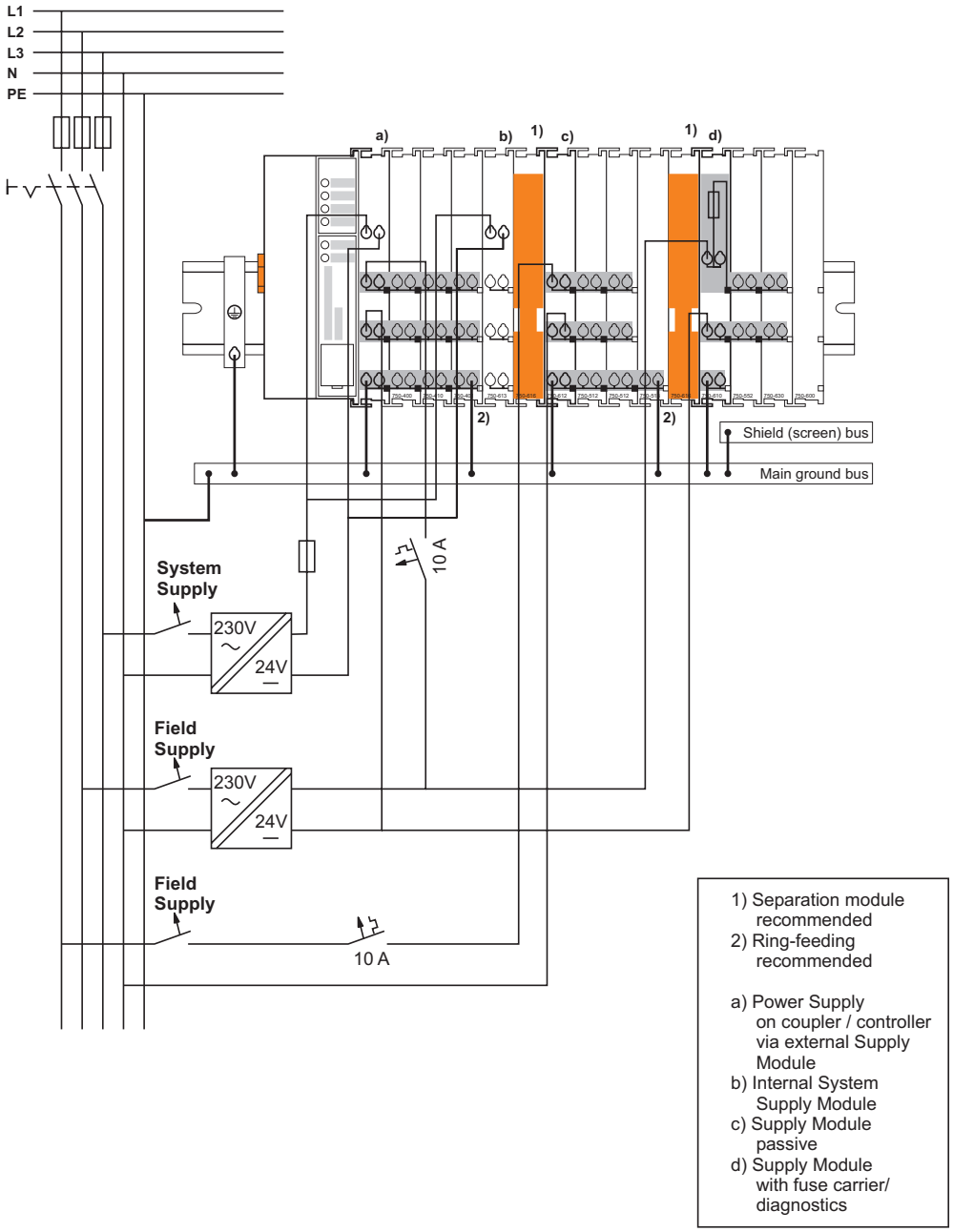


Fig. 2-22: Supply example

g0xxx04e

2.7.6 Power Supply Unit

The WAGO-I/O-SYSTEM 750 requires a 24 V direct current system supply with a maximum deviation of -15 % or +20 %.

Recommendation
A stable network supply cannot be taken for granted always and everywhere. Therefore, regulated power supply units should be used in order to guarantee the quality of the supply voltage.

A buffer (200 µF per 1 A current load) should be provided for brief voltage dips. The I/O system buffers for approx 1 ms.

The electrical requirement for the field supply is to be determined individually for each power supply point. Thereby all loads through the field devices and bus modules should be considered. The field supply as well influences the bus modules, as the inputs and outputs of some bus modules require the voltage of the field supply.

Attention
The system supply and the field supply should be isolated from the power supplies in order to ensure bus operation in the event of short circuits on the actuator side.

WAGO products Item No.	Description
787-903	Primary switched-mode, DC 24 V, 5 A wide input voltage range AC 85-264 V PFC (Power Factor Correction)
787-904	Primary switched-mode, DC 24 V, 10 A wide input voltage range AC 85-264 V PFC (Power Factor Correction)
787-912	Primary switched-mode, DC 24 V, 2 A wide input voltage range AC 85-264 V
 288-809 288-810 288-812 288-813	Rail-mounted modules with universal mounting carrier AC 115 V / DC 24 V; 0,5 A AC 230 V / DC 24 V; 0,5 A AC 230 V / DC 24 V; 2 A AC 115 V / DC 24 V; 2 A

2.8 Grounding

2.8.1 Grounding the DIN Rail

2.8.1.1 Framework Assembly

When setting up the framework, the carrier rail must be screwed together with the electrically conducting cabinet or housing frame. The framework or the housing must be grounded. The electronic connection is established via the screw. Thus, the carrier rail is grounded.

Attention
Care must be taken to ensure the flawless electrical connection between the carrier rail and the frame or housing in order to guarantee sufficient grounding.

2.8.1.2 Insulated Assembly

Insulated assembly has been achieved when there is constructively no direct conduction connection between the cabinet frame or machine parts and the carrier rail. Here the earth must be set up via an electrical conductor.

The connected grounding conductor should have a cross section of at least 4 mm^2.

Recommendation
The optimal insulated setup is a metallic assembly plate with grounding connection with an electrical conductive link with the carrier rail.

The separate grounding of the carrier rail can be easily set up with the aid of the WAGO ground wire terminals.

Item No.	Description
283-609	1-conductor ground (earth) terminal block make an automatic contact to the carrier rail; conductor cross section: 0.2 -16 mm^2 **Note**: Also order the end and intermediate plate (283-320).

2.8.2 Grounding Function

The grounding function increases the resistance against disturbances from electro-magnetic interferences. Some components in the I/O system have a carrier rail contact that dissipates electro-magnetic disturbances to the carrier rail.

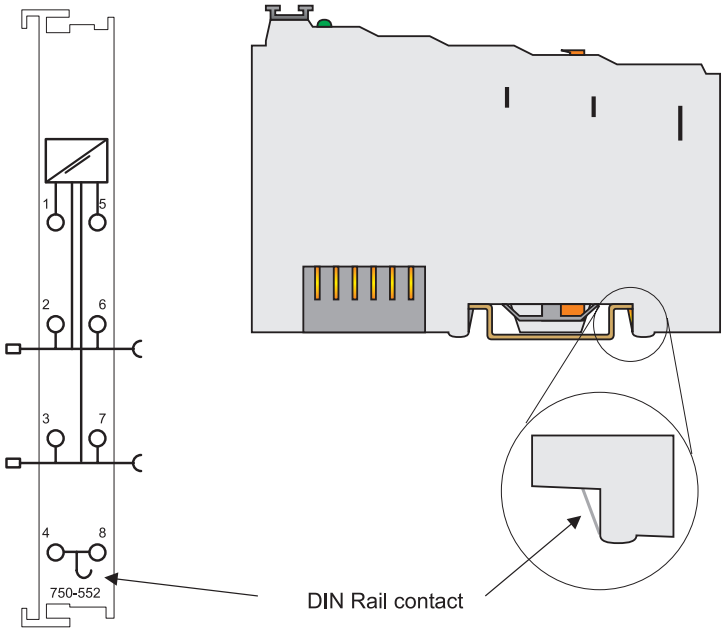


Fig. 2-23: Carrier rail contact g0xxx10e

Attention
Care must be taken to ensure the direct electrical connection between the carrier rail contact and the carrier rail.

The carrier rail must be grounded.

For information on carrier rail properties, please see chapter 2.6.3.2.

2.8.3 Grounding Protection

For the field side, the ground wire is connected to the lowest connection terminals of the power supply module. The ground connection is then connected to the next module via the Power Jumper Contact (PJC). If the bus module has the lower power jumper contact, then the ground wire connection of the field devices can be directly connected to the lower connection terminals of the bus module.

Attention
Should the ground conductor connection of the power jumper contacts within the node become disrupted, e. g. due to a 4-channel bus terminal, the ground connection will need to be re-established.

The ring feeding of the grounding potential will increase the system safety. When one bus module is removed from the group, the grounding connection will remain intact.

The ring feeding method has the grounding conductor connected to the beginning and end of each potential group.

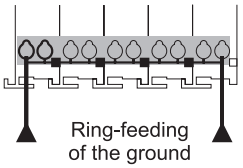


Fig. 2-24: Ring-feeding g0xxx07e

Attention
The regulations relating to the place of assembly as well as the national regulations for maintenance and inspection of the grounding protection must be observed.

2.9 Shielding (Screening)

2.9.1 General

The shielding of the data and signal conductors reduces electromagnetic interferences thereby increasing the signal quality. Measurement errors, data transmission errors and even disturbances caused by overvoltage can be avoided.

Attention
Constant shielding is absolutely required in order to ensure the technical specifications in terms of the measurement accuracy.

The data and signal conductors should be separated from all high-voltage cables.

The cable shield should be potential. With this, incoming disturbances can be easily diverted.

The shielding should be placed over the entrance of the cabinet or housing in order to already repel disturbances at the entrance.

2.9.2 Bus Conductors

The shielding of the bus conductor is described in the relevant assembly guidelines and standards of the bus system.

2.9.3 Signal Conductors

Bus modules for most analog signals along with many of the interface bus modules include a connection for the shield.

Note
For a better shield performance, the shield should have previously been placed over a large area. The WAGO shield connection system is suggested for such an application.
This suggestion is especially applicable if the equipment can have even current or high impulse formed currents running through (for example initiated by atmospheric discharge).

2.9.4 WAGO Shield (Screen) Connecting System

The WAGO Shield Connecting system includes a shield clamping saddle, a collection of rails and a variety of mounting feet. Together these allow many different possibilities. See catalog W4 volume 3 chapter 10.

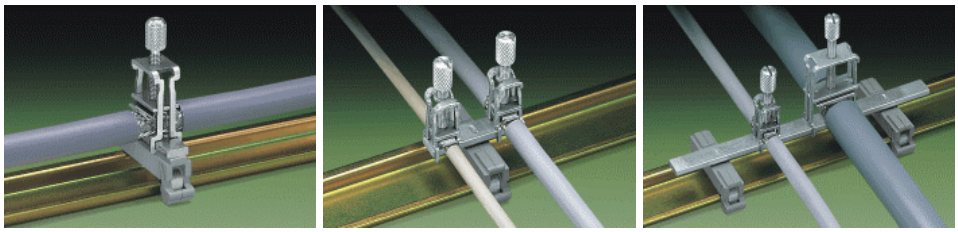


Fig. 2-25: WAGO Shield (Screen) Connecting System p0xxx08x, p0xxx09x, and p0xxx10x

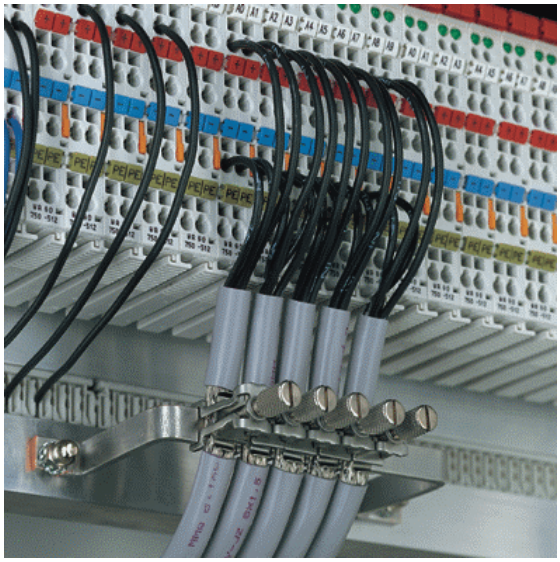


Fig. 2-26: Application of the WAGO Shield (Screen) Connecting System p0xxx11x

2.10 Assembly Guidelines/Standards

DIN 60204,	Electrical equipping of machines
DIN EN 50178	Equipping of high-voltage systems with electronic components (replacement for VDE 0160)

3 Programmable Field Bus Controller 750-833

3.1 Description

The programmable Field Bus Controller 750-833 combines the PROFIBUS DP-functionality of the Field Bus Coupler 750-333 with that of a programmable logic control (PLC). The application program is created with **WAGO-I/O-*PRO*** in accordance with IEC 61131-3. The programmer has access to all field bus and I/O data.

- Load relief for the central controls using decentral processing units
- Dividing complex applications into individual testable units
- Programmable fault reaction in the case of a field bus system failure
- Load relief of the communication system PROFIBUS DP by signal preprocessing
- Reduction of reaction times by direct access to the periphery (without having pass through the field bus system PROFIBUS DP)
- Stand Alone, smallest scale control (station address 0)
- Use for decentral and central control
- Programmable in accordance with IEC 61131-3 in all 5 languages: IL, LD, FBD, ST and SFC.

In the initialization phase, the coupler determines the physical structure of the node and creates the process image of all inputs and outputs on this basis. In this process, it looks at all of the byte-orientated (complex) terminals from the point of view of the internal PLC (CPU) and allocates them to the appropriate process image (input and/or output image) in its order from the bus controller to the final terminal.
Afterwards, all binary bus terminals are allocated to each process image after appearing on the node. This takes place continuously in one byte array.

The PROFIBUS process image mirrors the physical arrangement of the bus terminals. It is also possible to combine terminals with a granularity of 2 or 4 bits into bytes.

The physical structure of the field bus node may be individually adapted to the configuration of each system without changing the addressing of a global control application. This is done by parameterizing the modules accordingly with the aid of the planning environment (for instance, WAGO NETCON, COM PROFIBUS, STEP7, Profi-Map, etc.).

- The diagnostics concept is based on the identification and channel based diagnostics in accordance with EN 50170. In this manner it is not necessary to program modules for evaluation of the manufacturer specific diagnostics information.

- Process data length
  max. 244 byte input process image (128 byte up to SW 02)
  max. 244 byte output process image (128 byte up to SW 02)

- Automatic recognition of the transmission speed on the PROFIBUS of 9.6 kBd to 12 MBd

- All I/O modules from the WAGO-I/O-SYSTEM 750 are supported

- Configuration modules can be parameterized as wildcards.

- Parameterizable substitute value for each channel

- D-Sub 9 pole bus connection

3.2 Hardware

3.2.1 View

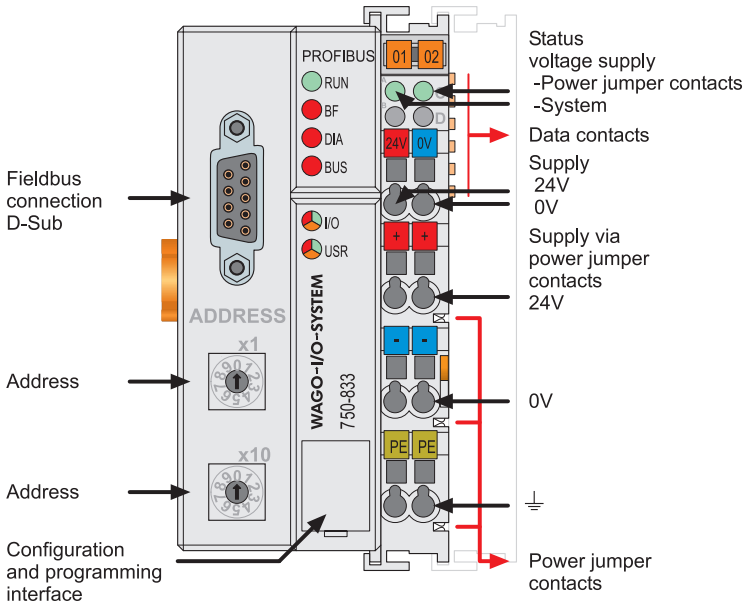


Fig. 3.2.1-1: Field Bus Coupler 750-833 PROFIBUS DP/V1 g083300e

The Controller comprises of:

- Device supply with internal system supply module for the system supply as well as power jumper contacts for the field supply via assembled I/O modules
- Field bus connection
- 2 rotary switches for the station address (decimal)
- Display elements (LED) for status display of the operation, the bus communication, the operating voltages as well as for fault messages and diagnostics
- Configuration and programming interface
- Operating mode switch
- Electronics for communication with the I/O modules (internal bus) and the field bus interface

3.2.2 Device Supply

The supply is fed via clamps with CAGE CLAMP® connection. Device supply is intended for system supply and field side supply.

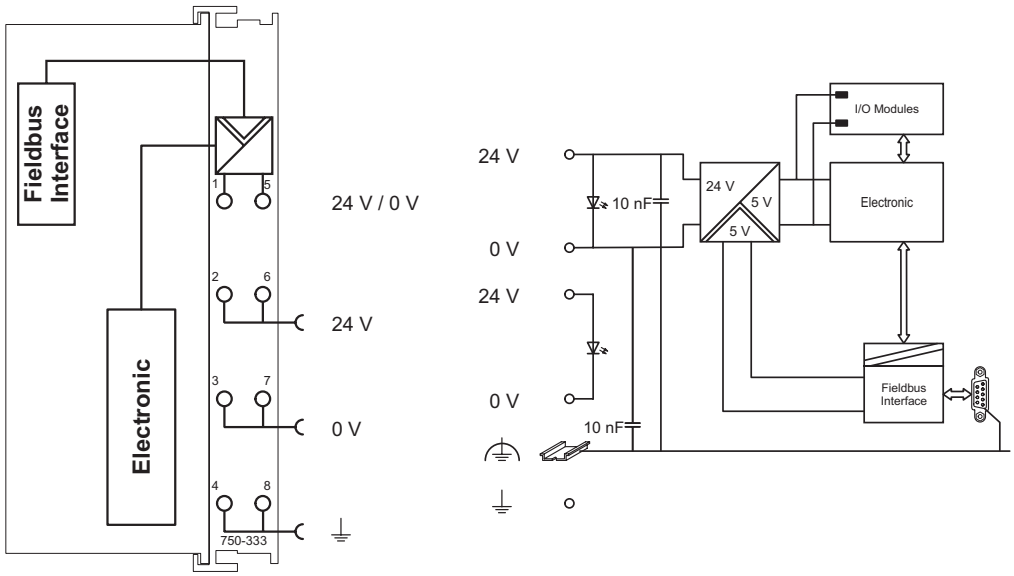


Fig. 3.2.2-2: Device supply g033301e

The integrated internal system supply module generates the necessary voltage to supply the electronics and the connected I/O modules.

The field bus interface is supplied with galvanically isolated voltage from the internal system supply module.

3.2.3 Field Bus Connection

The PROFIBUS interface is designed as a D-Sub connection in accordance with the US Standard EIA RS 485 for cable linked data transmission.

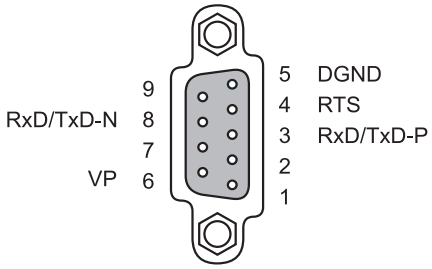


Fig. 3.2.3-3: Bus connection, D-Sub female connector g012102x

Pin	Signal	Description
3	RxD(TxD)-P	Transmit (receive) signal
4	RTS	Ready to send
5	GND	Supply ground
6	Vcc	Supply voltage
8	RxD(TxD)-N	Transmit (receive) signal

The galvanic isolation between the field bus system and the electronics is achieved by means of DC/DC converter and optocoupler.

The connection point is mechanically lowered permitting fitting in an 80 mm high switch box once connected.

3.2.4 Display Elements

The operating status of the field bus coupler or of the node is signaled via light diodes (LED).

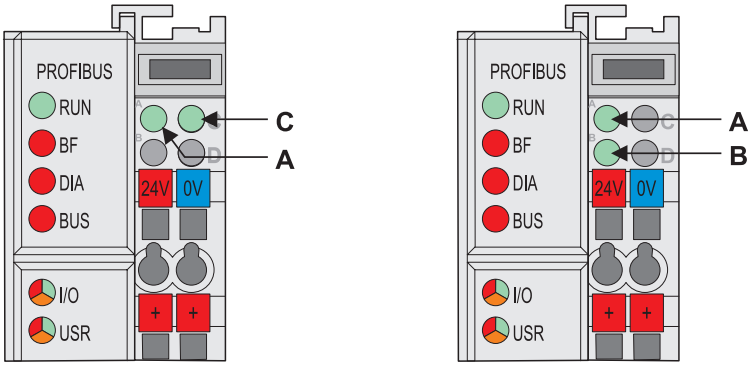


Fig. 3.2.4-4: Display elements 750-833 g012107x

LED	Color	Meaning
RUN	green	The RUN-LED indicates to the user whether the field bus coupler / controller is correctly initialized.
BF	red	The BF-LED indicates whether the communication via the PROFIBUS is functioning.
DIA	red	The DIA-LED indicates an external diagnostics. The signaling is not supported by all devices.
BUS	red	The BUS-LED signals a projecting fault.
IO	red /green / orange	The I/O-LED indicates the operation of the node and signals faults occurring.
USR	red /green / orange	The USR-LED can be selected by a user program in a programmable field bus controller.
A	green	Status of the operating voltage – system
C	green	Status of the operating voltage – power jumper contacts

*) LED-Position depends on manufacturer

3.2.5 Station Address

The station address is determined via two decimal rotary switches on the bus controller.

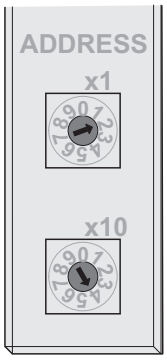


Fig. 3.2.5-5: Creating the station address g012108x

The switch „x1“ determines the unit position of the address. The switch „x10“ determines the tens position of the address. Valid station addresses lie between 1 and 99.

The station address is taken over by the field bus coupler after switching on the device (initialization phase). Adjustments to the switch during operation have no effect.

Note
After Power-On the station address 0 causes the run-up of the controller and start of the PFC functions, without the field bus being active.
Using this function, an Stand Alone, smallest scale control can be realized using the WAGO-I/O-SYSTEM 750

Any station address may be used from SW 03. The user determines whether the controller may start up with the default configuration using a functional building block.

3.2.6 Configuration and Programming Interface

The configuration and programming interface is located behind the cover flap. This is used to communicate with WAGO-I/O-CHECK and **WAGO-I/O-*PRO*** as well as for firmware transmitting.

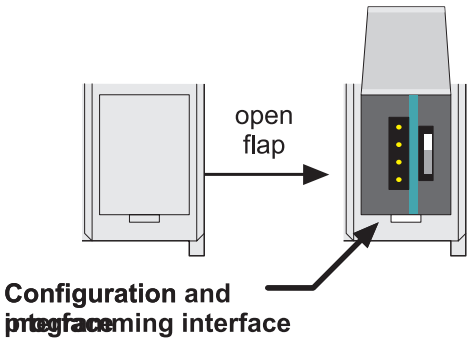


Fig. 3.2.6-6: Configuration interface g01xx07e

The communication cable (750-920) is connected to the 4 pole male header.

Warning
The communication cable 750-920 must not be connected or disconnected while the coupler/controller is powered on!

3.2.7 Operating Mode Switch

The operating mode switch is located behind the cover flap.

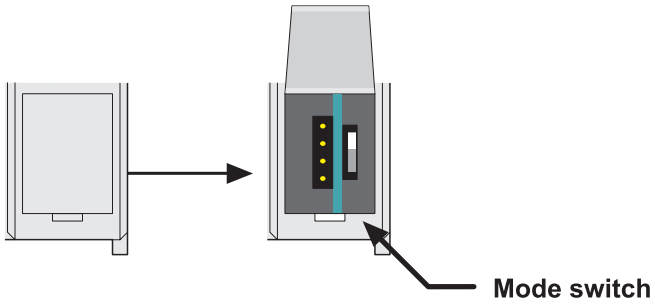


Fig. 3.2.7-7: Operating mode switch g01xx10e

The switch is a push/slide switch with 3 settings and a hold-to-run function.

Operating Mode Switch	Function
From middle to top position	Activate program processing (RUN)
From top to middle position	Stop program processing (STOP)
Lower position, bootstrap	For original loading of firmware, not necessary for user
Push down (e. g with a screwdriver)	Hardware reset All outputs and flags are reset; variables are set to 0 or to FALSE or to an initial value. The hardware reset can be performed with STOP as well as RUN in any position of the operating mode switch!

An operating mode is internally changed at the end of a PFC cycle.

Warning
If outputs are set when switching over the operating mode switch from RUN to STOP they remain set! Switching off on the software side e.g. by initiators, are ineffective, because the program is no longer processed.

Note
With "GET_STOP_VALUE" (library "System.lib") **WAGO-I/O-*PRO*** provides a function which serves to recognize the last cycle prior to a program stop giving the user the possibility to program the behavior of the controller in case of a STOP. With the aid of this function the controller outputs can be switched to a safe condition.

3.3 Operating System

3.3.1 Run-Up

The controller runs-up after switching on the supply voltage or after a hardware reset. The PFC user program in the flash memory is transferred to the RAM . The I/O-LED flashes orange.

The controller then checks the internal bus and the field bus interface . Following this the I/O modules and the present configuration is determined. At the same time a list is generated which is not visible from outside. This includes an input and an output area, which is shown on the field bus RAM of the protocol chip. This is followed by the initialization of the system. The variables are set to 0 or to FALSE or to an initialization value given by the PLC program. The flags retain their status. The I/O-LED blinks red during this phase.

Following a fault free run-up the controller changes over to the "field bus start" mode . The I/O-LED lights up green.

A PFC user program does not yet exist in the flash memory when delivered. The controller runs-up as described, without initializing the system. It then behaves as a coupler.

3.3.2 PFC Cycle

The PFC cycle starts following a fault free run-up when the operating mode switch is in the top position or by a start command from the **WAGO-I/O-*PRO***. The input and output data of the field bus and the I/O modules as well as the times are read. Subsequently the PFC user program in the RAM is processed followed by the output data of the field bus and the I/O modules in the process image . Operating system functions, amongst others, for diagnostics and communication are performed and the time is actualized at the end of the PFC cycle. The cycle starts again with the reading in of the input and output data and the times.

The change of the operating mode (STOP/RUN) is made at the end of a PFC cycle.

The cycle time is the time from the start of the PFC user program to the next start. If a loop is programmed within a PFC user program the PFC run time and thus the PFC cycle are extended correspondingly.

The inputs, outputs and times are not updated during the processing of the PLC program. This actualization occurs in a defined manner only at the end of the PLC program. For this reason it is not possible to wait for an event from the process or the elapse of a time within a loop.

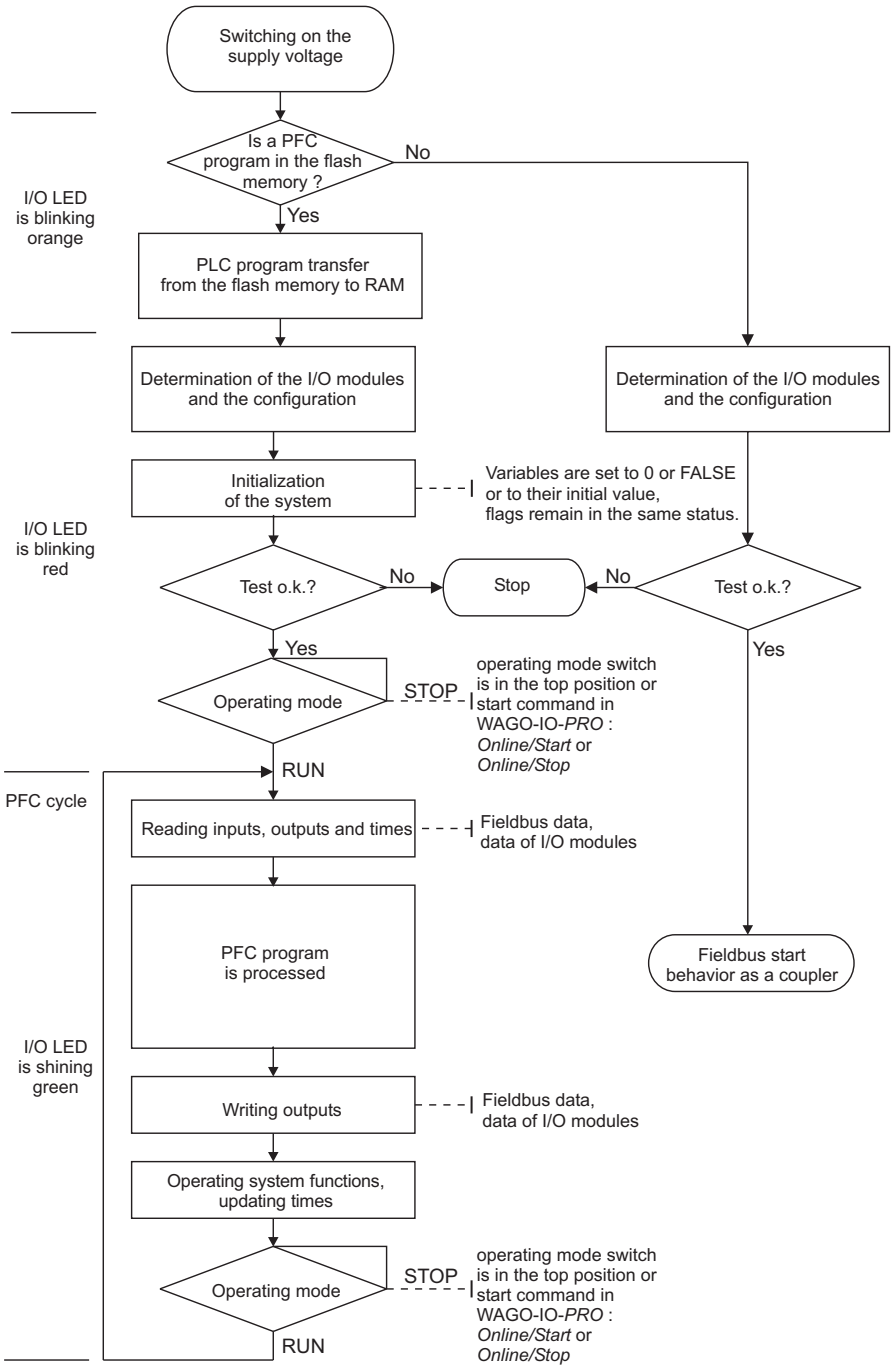


Fig. 3.3.2-8: Operating system 750-833 g012112e

3.4 Process Image

3.4.1 Local Process Image

The process is mapped on the PROFIBUS with the module configuration. This is the reason why this description is only important for programming the controller with **WAGO-I/O-*PRO*.**

After power-up, the controller recognizes all I/O modules connected in the node (data width/bit width > 0). Analog and digital I/O modules can be mixed.

The controller generates an internal local process image from the data width and the type of I/O module as well as the position of the I/O modules in the node. This is divided into an input and an output area.

Attention
For the number of input and output bits or bytes of the individual I/O modules please refer to the corresponding description of the I/O modules.

The data of the I/O modules is separated for the local input and output process image in the sequence of their position after the controller in the individual process image.
First of all, the byte-orientated bus terminals are filed in the process image and then the bit-orientated. The bits of the digital terminals are combined into bytes. If the number of digital I/Os is greater than 8 bits, the coupler automatically begins another byte.

Attention
If a node is changed or extended this may result in a new process image structure. In case of an extension the process data of all previous clamps is to be considered.

In addition, the data of the PFC variables are separated according to input and output data and put into the process image of the controller.

3.4.2 Allocation of the Input and Output Data

The process data is exchanged via PROFIBUS with the higher ranking controls (Master). A maximum of 244 bytes (128 byte up to SW 02) of data is transmitted from the master to the controller, or node, to the output data. The controller returns a maximum of 244 bytes (128 byte from SW 03) input data as a reply to the master.

When projecting a node, the individual modules are configured according to their physical arrangement. These modules can be copied from a hardware catalogue of the projecting tool. The information covering the possible modules is saved in the GSD file.

The controller generates an internal mapping according to the installed and configured settings of the node, in which the allocation of the input and output data is determined in the local process image with the position in the PROFIBUS DP Telegram.

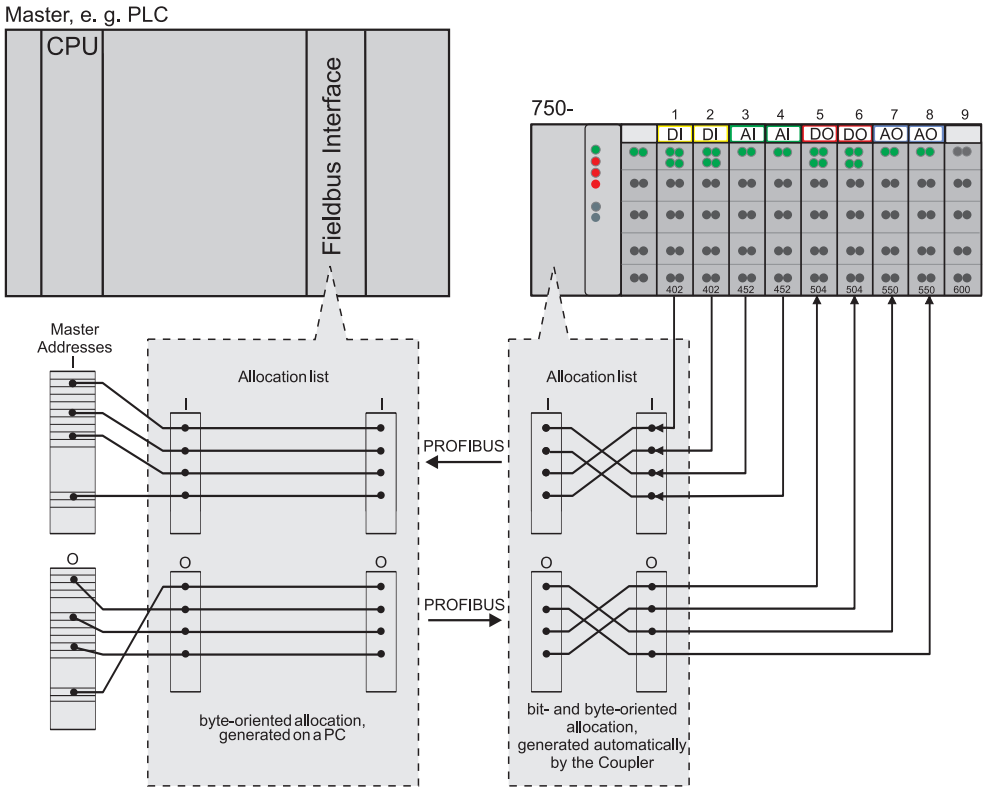


Fig. 3.4.2-9: Allocation of the input and output data g012117e

The PFC variables are also configured through the hardware catalogue.

From 1 to 64 bytes of input variables and from 1 to 64 bytes output variables may be configured for field bus controllers up to SW 03.
In addition, there are **PFC configuration modules** available with data type information from SW 03.

Note
PFC output variables are defined from point of view of the programmable field bus controller. From the point of view of PROFIBUS, these are input variables. Accordingly, PFC input variables are output variables for IEC 61131-3 access of the field bus:

IEC 61131-3 input variable	= PFC output variable
PFC input variable	= IEC 61131-3 output variable

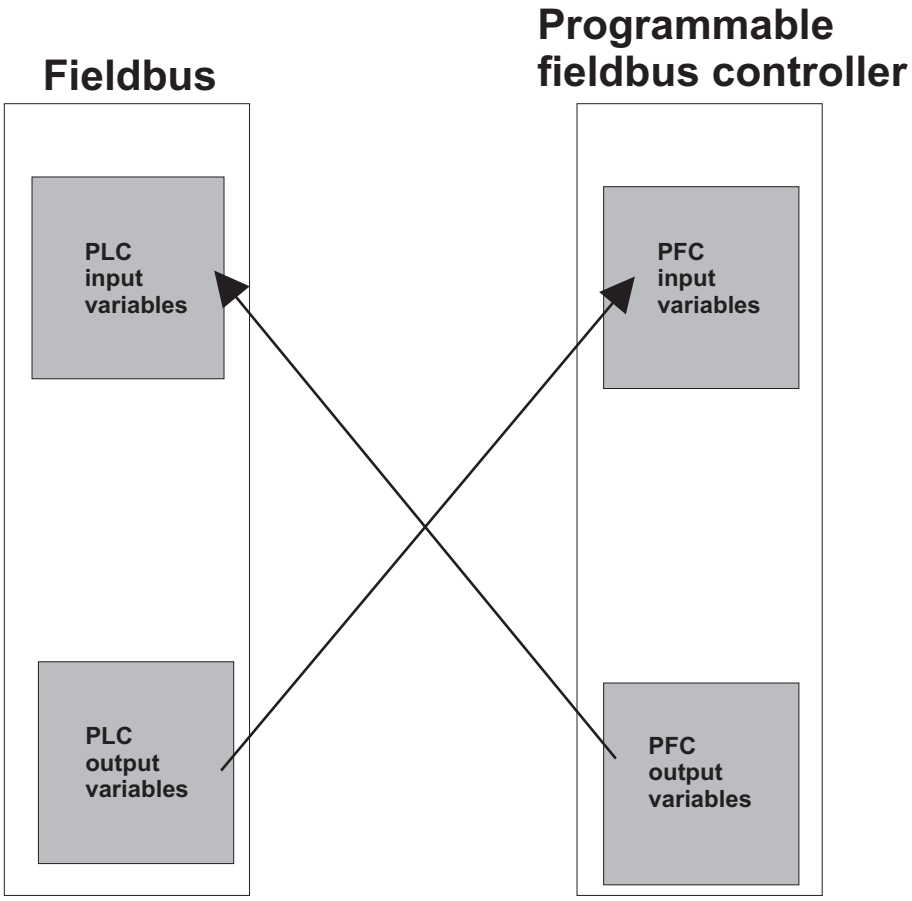


Fig. 3.4.2-10: Correlation of IEC 61131-3 variables and PFC variables g012444e

3.4.3 Process Data Structure for PROFIBUS-DP

With some I/O modules, the structure of the process data is field bus specific.

Depending on how the coupler is parameterized, the status bytes (S), control bytes (C) and data bytes (D0...Dn) of the byte or word orientated modules are transmitted via PROFIBUS in Motorola or Intel format.

More Information
You can find the field bus specific process data structure for all I/O Modules of WAGO-I/O-SYSTEM 750 and 753 in chapter 5.2, “Design of the Process Data for PROFIBUS-DP”.

3.4.4 Data Exchange

For data exchange, the controller is equipped with three interfaces:

- The interface to field bus (-master),
- The PLC functionality of the PFC (CPU) and
- The interface to the bus modules

Data exchange takes place between the field bus master and the bus modules, between the PLC functionality of the PFC (CPU) and the bus modules as well as between the field bus master and the PLC functionality of the PFC (CPU).

3.4.5 Memory Areas

The controller uses a memory space of 256 words (word 0 ... 255) for the physical input and output data. The controller is assigned an additional memory space for mapping the PFC variables defined according to IEC 61131-3. This extended memory space (word 256 ... 511 each) is used to map the PFC variables behind the physical process image. The division of the memory spaces and the access of the PLC functionality (CPU) to the process data is identical with all WAGO field bus controllers. Access is via an application related IEC 61131-3 program and independent on the field bus system.

Access from the field bus side is field bus specific.

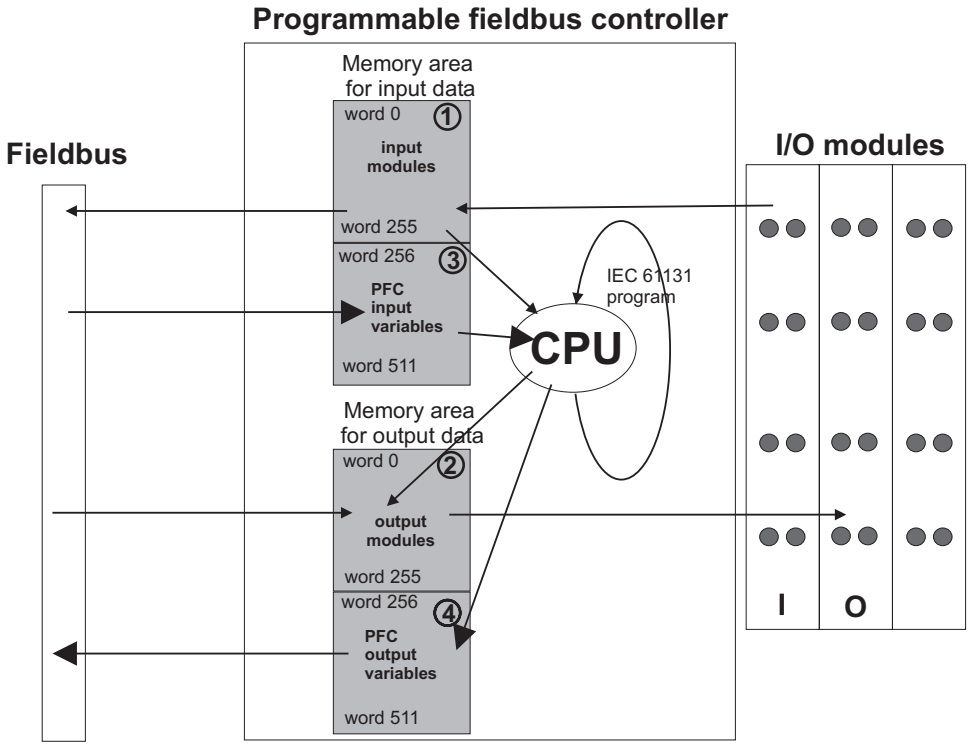


Abb. 3-11: Memory areas and data exchange for a field bus controller g012434d

In its memory space word 0 ... 255, the controller process image contains the physical data of the bus modules.

① The data of the input modules can be read by the CPU and from the field bus side.

② In the same manner, writing to the output modules is possible from the CPU and from the field bus side. The value of the field bus master is written to the output while writing on an output.

The PFC variables are filled in the memory space word 256 ... 511 of the process image.

③ The PFC input variables are written in the input memory space from the field bus side and read by the CPU for further processing.

④ The variables processed by the CPU via the IEC 61131-3 program are filed in the output memory space and can be read out by the master.

In addition, the controller offers further memory spaces, which cannot be accessed from the field bus side:

RAM The RAM memory is used to create variables not required for communication with the interfaces but for internal processing, such as computation of results.

Retain The retain memory is a non-volatile memory, i.e. all values are retained following a voltage failure. The memory management is automatic. In this memory area, flags for the IEC 61131-3 program are filed together with variables without memory space addressing or variables, which are explicitly defined with "var retain".

Note
The automatic memory management can cause a data overlap. For this reason, we recommend not to use a mix of flags and retain variables.

Code memory The IEC 61131-3 program is filed in the code memory. The code memory is a flash ROM. Once the supply voltage is applied, the program is transmitted from the flash to the RAM memory. After an error-free start-up, the PFC cycle starts when the operating mode switch is turned to its upper position or by a start command from **WAGO-I/O-*PRO***.

3.4.6 Addressing

3.4.6.1 I/O Module Data

The CPU has direct access to the bus terminal data through absolute addresses. Addressing is organized word-by-word and begins with the address 0 both with inputs and outputs. The corresponding addresses for bits, bytes and double words (dword) are derived from the word addresses.

Data Size	Addresses up to SW 02								
Bit	0.0 ... 0.7	0.8 ... 0.15	1.0 ... 1.7	1.8 ... 1.15	...	62.0 ... 62.7	62.8 ... 62.15	63.0 ... 63.7	63.8 ... 63.15
Byte	0	1	2	3	...	124	125	126	127
Word	**0**		**1**		**...**	**62**		**63**	
Dword	0				...	31			

Data Size	Addresses from SW 03								
Bit	0.0 ... 0.7	0.8 ... 0.15	1.0 ... 1.7	1.8 ... 1.15	...	120.0 ... 120.7	120.8 ... 120.15	121.0 ... 121.7	121.8 ... 121.15
Byte	0	1	2	3	...	240	241	242	243
Word	**0**		**1**		**...**	**120**		**121**	
Dword	0				...	60			

The structure of the process image is described in chapter 3.4., “Process Image” is done in this structure.

Input data	%IW0 | $\%IW_n$	word oriented data
	$\%I_{n+1}$ | $\%I_{n+m}$	bit oriented data
Output data	%QW0 | $\%QW_n$	word oriented data
	$\%Q_{n+1}$ | $\%Q_{n+m}$	bit oriented data

3.4.6.2 Field Bus Variables

Data Size	Addresses up to SW 02								
Bit	256.0 ... 256.7	256.8 ... 256.15	257.0 ... 257.7	257.8 ... 257.15	...	318.0 ... 318.7	318.8 ... 318.15	319.0 ... 319.7	319.8 ... 319.15
Byte	512	513	514	515	...	636	637	638	639
Word	**256**		**257**		**...**	**318**		**319**	
Dword	128				...	159			

Data Size	Addresses from SW 03								
Bit	256.0 ... 256.7	256.8 ... 256.15	257.0 ... 257.7	257.8 ... 257.15	...	376.0 ... 376.7	376.8 ... 376.15	377.0 ... 377.7	377.8 ... 377.15
Byte	512	513	514	515	...	752	753	754	755
Word	**256**		**257**		**...**	**376**		**377**	
DWord	128				...	188			

3.4.6.3 Flags

Data Size	Addresses								
Bit	0.0 ... 0.7	0.8 ... 0.15	1.0 ... 1.7	1.8 ... 1.15	...	4094.0 ... 4094.7	4094.8 ... 4094.15	4095.0 ... 4095.7	4095.8 ... 4095.7
Byte	0	1	2	3	...	8188	8189	8190	8191
Word	**0**		**1**		**...**	**4094**		**4095**	
Dword	0				...	2047			

All flags are non volatile (retain).

3.4.6.4 Calculate Addresses

The word address is the basis for calculation (word).

Bit Address	Word address .0 to .15
Byte Address	1st byte: 2 x Word address 2nd byte: 2 x Word address + 1
Dword Address	lower section: Word address (even numbers) / 2 upper section: Word address (odd numbers) / 2, rounded off

3.4.6.5 Example for Absolute Addresses

Data Size	**Inputs**			
Bit	%IX14.0 ... 15		%IX15.0 ... 15	
Byte	%IB28	%IB29	%IB30	%IB31
Word	**%IW14**		**%IW15**	
Dword	%ID7			

Data size	**Outputs**			
Bit	%QX5.0 ... 15		%QX6.0 ... 15	
Byte	%QB10	%QB11	%QB12	%QB13
Word	**%QW5**		**%QW6**	
Dword	%QD2 (upper part)		%QD3 (lower part)	

Data Size	**Flags**			
Bit	%MX11.0 ... 15		%MX12.0 ... 15	
Byte	%MB22	%MB23	%MB24	%MB25
Word	**%MW11**		**%MW12**	
Dword	%MD5 (upper part)		%MD6 (lower part)	

The character 'X' for single bits can be deleted, e. g.%I14.0, %Q6.10, %M11.7

3.5 Programming of the PFC with WAGO-I/O-*PRO*

Due to the IEC 61131 programming of the PROFIBUS field bus controller 750-833 you have the option to use the functionality of a PLC beyond the functions of field bus coupler 750-333.
An application program according to IEC 61131-3 is created using the programming tool **WAGO-I/O-*PRO***.

This manual, however, does not include a description of how to program with **WAGO-I/O-*PRO***. In contrast, the following chapters are to describe the special modules for **WAGO-I/O-*PRO*** for you to utilize explicitly for programming the PROFIBUS field bus controller.
The description also explains transmitting the IEC 61131-3 program into the controller and loading a suitable communication driver.

More Information
For a detailed description of how to use the software, please refer to the **WAGO-I/O-*PRO*** manual.

3.5.1 PROFIBUS Library for WAGO-I/O-*PRO*

You are offered various libraries for different IEC 61131-3 programming applications in **WAGO-I/O-*PRO***. They contain modules for universal use and can, thereby, facilitate and speed up the creation of your program. As standard, the library 'standard.lib' is available for you.

The library described in the following is specifically intended for PROFIBUS projects with **WAGO-I/O-*PRO*** :

- PROFIBUS.LIB
- PNO_COM_PROXY.LIB

This library is loaded on the **WAGO-I/O-*PRO*** CD.
Having integrated this library, you have access to its POUs, data types and global variables, which can be used in the same manner as those defined by yourself.

More Information
For a detailed description of the POUs and the software operation, please refer to the **WAGO-I/O-*PRO*** manual.

3.5.2 IEC 61131-3 Program Transfer

Program transfer from the PC to the controller following programming of the desired IEC 61131 application can be made in two different ways:

- via the serial interface or
- via the field bus.

A suitable communication driver each is required for both types.

More Information
For information on the installation of the communication drivers as well as details regarding the use of the software, please refer to the **WAGO-I/O-*PRO*** manual **.**

Note
The station address 0 starts up the controller after switching on POWER-ON and it also starts the PFC functions without the field bus being active.
This function allows an autarkic smallest scale control with the WAGO-I/O-SYSTEM 750.
Autarkic smallest scale control

Any station address may be used from SW 03. The user determines whether the controller may start up with the default configuration using a functional building block.

3.5.2.1 Transmission via the Serial Interface

Use the WAGO communication cable to produce a physical connection via the serial interface. This is contained in the scope of delivery of the programming tool IEC 1131-3, order No.: 759-333, or can be purchased as an accessory under order No.: 750-920.
Connect the COM port of your PC with the communication interface of your controller via the WAGO communication cable.

Warning
The communication cable 750-920 must not be connected or disconnected while the coupler/controller is powered on!

A communication driver is required for serial data transmission. In **WAGO-I/O-*PRO*** , this driver and its parameters are entered in the "**Communication parameters**" dialog.

1. Start the **WAGO-I/O-*PRO*** software via 'Start/Programs' or by double clicking on the **WAGO-I/O-*PRO*** symbol on your desk top.

2. In the "**Online**" menu click on the "**Communication parameters**" menu point. The dialog "Communication parameters" opens.

3. In the selection window mark the desired driver on the right-hand dialog side (i.e. "**Serial (RS232)**", to configure the serial connection between PC and the controller).

4. In the center window of the dialog, the following entries have to appear:
   -Parity: Even
   -Stop bits: 1
   If necessary, change the entries accordingly.
   You can now commence testing the controller.

Note
To be able to access the controller, ensure that the operating mode switch of the controller is set to the center or the top position.

5. Under "**Online**" click on the "**Log-on**" menu point to log into the controller. (The **WAGO-I/O-*PRO* Server** is active during online operation. The communication parameters cannot be polled.)

6. If there is not a program in the controller, a window appears asking whether or not the program is to be loaded. Confirm with "**Yes**". Subsequently the current program will be loaded.

7. As soon as the program is loaded, you can start the program via the "**Online**" menu, menu point "**Start**". At the right-hand end of the status bar, the system signals "**ONLINE RUNNING**".

8. To terminate the online operation, return via the "**Online**" menu and click on the "**Log-off**" menu point.

3.5.2.2 Transmission via the Field Bus

The field bus cable is the physical connection between the PC and the controller. It is necessary to have a suitable communication driver for data transmission. This driver and its parameterization is entered in **WAGO-I/O-*PRO*** in the **“communication parameter”** dialog.#

3.5.2.2.1 MSAC2 Interface

The communication between **WAGO-I/O-*PRO*** and the PFC run-time system of the field bus coupler is performed via the READ and WRITE services of the acyclic communication channel MSAC2 (Master-Slave-Acyclic Class 2). This channel exists parallel to the cyclic data exchange MSCY (Master-Slave-Cyclic) and has no influence on it. The program download and debugging transmission speed is very effective, since the relevant telegrams are sent or received in a PROFIBUS telegram. The transmission speed depends on the physical requirements of PROFIBUS (e.g. baud rate).

1. Start the **WAGO-I/O-*PRO*** software via 'Start/Programs' or by double clicking on the WAGO-I/O-PRO- symbol on your desktop.

2. In the "**Online**" menu click on the "**Communication parameters**" menu point

3. Click on the "**New**" button to define a driver in the "Communication parameter" dialog.

4. Enter any name and mark the desired driver "**Hilscher PA Interface Standard**" in the selection window of the dialog. Subsequently confirm with "**OK**".

5. The following entries have to appear in the center window of the dialog:
   - Interface
   Number of the Interface corresponding to PC configuration
   Class 2 station address of the master
   - Baud rate
   Baud rate of the PROFIBUS system
   - Node number
   Station address of the PROFIBUS controller to be programmed
   - Highest station address
   Highest station address in the PROFIBUS network
   - Waiting time
   Waiting time in ms for the preparation of the station list
   - Data base
   To operate the PROFIBUS card (WAGO) as a class 2 master, the data base on the card must be deleted only once by **WAGO-I/O-*PRO***. Once the data base has been deleted, it can be left unchanged.

Note
Prerequisite for the access to the controller is that the operating mode switch of the controller is in the center or top position.

6. Under "**Online**" click on the "**Log-on**" menu point to log into the controller.
   (During online operation, the **WAGO-I/O-*PRO* server** is active. The communication parameters cannot be polled.)

7. If there is not a program contained in the controller, a window appears asking whether or not the program is to be loaded. Confirm with "**Yes**". Subsequently the current program is loaded.

8. As soon as the program is loaded, you can start processing the program via the "**Online**" menu, menu point "**Start**".
   At the right-hand end of the status bar, the system signals "**ONLINE RUNNING**".

9. To terminate the online operation, return via the "**Online**" menu and click on the "**Log-off**" menu point.

3.6 Configuration

3.6.1 Configuration of the I/O Modules

The configuration of the node is performed in accordance with the physical requirements of the field bus controllers and I/O modules.

The field bus controller or the process data channel is to be configured on the first slot.
The other slots are configured in accordance with the physical requirements of the I/O modules, whereby only I/O modules with process data are relevant.
The supply modules without diagnostics, the bus internal system supply module and the termination module are to be ignored during configuration, as they do not provide any process data.

2 or 3 modules per I/O module are entered in the hardware catalogue. The modules appear as
750-xyz ..., e.g. ***750-400 2 DI/24 V DC/3.0 ms***. and ***PFC 750-xyz ...***, e. g. ***PFC 750-400 2 DI/24 V DC/3.0 ms***.
The identification ***PFC 750-xyz ...*** states that the module concerned is exclusively processed by the internal control application. Its process data is not transmitted via the PROFIBUS DP to the master or to the higher ranking controls.

Also the entry ****750-xyz ...***. is listed for all binary modules with a channel granularity of 2 and 4. When using this identification the controller adds the binary information of the current module in a byte previously opened with ***750-xyz ...***. The use of a „*“ module is only permitted when the number of channels is less or identical to the remaining bits in the previously opened byte. The binary I/O modules combined in a byte may be at different locations, i.e. binary I/O modules of a different signal type or byte orientated I/O modules can be connected between.

In order to configure the scope of the connected peripheries individually and independent of the control program, it is possible to parameter the I/O modules in the configuration table as „not plug fitted“. In this manner the process data still on the PROFIBUS DP can be filtered for the individual module and not transmitted to the periphery or read by it.

3.6.2 Configuration of the Field Bus Variables

With the 750-833, after configuration of the connected periphery, the memory area is configured due to the variable arrangement of the field bus variables.

There are configuration modules up to **SW 02**.

For the Input Image	For the Output Image
1 byte PFC-Outputs 2 byte PFC- Outputs up to 64 byte PFC- Outputs	1 byte PFC- Inputs 2 byte PFC- Inputs up to 64 byte PFC- Inputs

PFC configuration modules are used in the GSD file with data type information from **SW 03**.

For the Input Image	For the Output Image
1 byte PFC-Outputs (data type) 2 byte PFC-Outputs (data type) etc.	1 byte PFC- Inputs (data type) 2 byte PFC- Inputs (data type) etc.

Data types: Boolean
Integer8, Integer16, Integer32
Unsigned8, Unsigned16, Unsigned32
Visib. String
Octet String

The previously used modules are still supported.

By optionally combining the existing modules it is possible to project the required length on the field bus variables for PROFIBUS DP.

Attention
The SFC 14 or SFC 15 is to be used with S7 if the PFC inputs or PFC outputs are more than 4 bytes. The same also applies for I/O modules with a data width of more than 4 bytes.

3.6.3 GSD Files

Under PROFIBUS DP the features of the devices are defined by the manufacturer in the form of a GSD file (device master data) and made available to the user.

The GSD files are standardized so that configuration of any DP Slave can be done with the configuration software from the various manufactures.

More Information
The PNO provides information about the GSD files of all listed manufacturers.

GSD and symbol files for the configuration of the I/O modules are available on the CD ROM ELECTRONICC Tools and Docs (Art.-Nr.: 0888-0412) or at http://www.wago.com.

GSD File for I/O Module 750-833	**WAGOB756.GSD**

The GSD file is read by the configuration software and the corresponding settings are transferred. For the necessary entries and handling steps please refer to the software user manuals.

3.6.4 Identification Bytes

The identification bytes contain information about the structure and the scope of the inputs and outputs of the device. For projecting, each I/O module is allocated an identification or module.

Bit								Meaning
7	6	5	4	3	2	1	0	
				0 0 0 ... 1	0 0 0 ... 1	0 0 1 ... 1	0 1 0 ... 1	**Data length** 1 byte or word 2 bytes or words 3 bytes or words ... 16 bytes or 16 words
		0 0 1 1	0 1 0 1					**Input and output** Spec. identification formats Input Output Input and output
	0 1							**Format** 0 = byte structure 1 = word structure
0 1								**Consistency about** Byte or word Total length

For the special identification byte (bit 4 and 5 = 00) is defined:

Bit								Meaning
7	6	5	4	3	2	1	0	
				0 0 ... 1 1	0 0 ... 1 1	0 0 ... 1 1	0 1 ... 0 1	**Length of the manufacturer specific data** 0 = no manufacturer specific data 1 ... 14 = length of the manufacturer specific data 15 = no manufacturer specific data follows
		0	0					**Input and output** Spec. identification formats
0 0 1 1	0 1 0 1							**Input and output** unassigned slot a length byte for inputs follows a length byte for outputs follows a length byte each for inputs and outputs follows

Structure of the length bytes:

Bit								Meaning
7	6	5	4	3	2	1	0	
		0 ... 1	0 ... 1	0 ... 1	0 ... 1	1 ... 1	0 ... 1	**Data length** 1 byte or word ... 63 bytes or 63 words
	0 1							**Format** 0 = byte structure 1 = word structure
0 1								**Consistency about** Byte or word Total length

Since the adoption of the DP/V1 specification, it is possible to add data type information to the process data that is described via the special identification byte. This is done using the manufacturer specific data.

Structure of the identification:

Octet 1								
Bit								Meaning
7	6	5	4	3	2	1	0	
				0 0 ... 1 1	0 0 ... 1 1	0 0 ... 1 1	0 1 ... 0 1	**Length of the manufacturer specific data** 0 = no manufacturer specific data 1 ... 14 = length of the manufacturer specific data 15 = no manufacturer specific data follows
		0	0					**Input and output** Spec. identification formats
0 0 1 1	0 1 0 1							**Input and output** unassigned slot a length byte for inputs follows a length byte for outputs follows a length byte each for inputs and outputs follows

Structure of the length bytes:

Octet 2 / 3								
Bit								Meaning
7	6	5	4	3	2	1	0	
		0 ... 1	0 ... 1	0 ... 1	0 ... 1	1 ... 1	0 ... 1	**Data length** 1 byte or word ... 63 bytes or 63 words
	0							**Formats** Byte structure
1								**Consistency about** Total length

The data coding in the following octets is defined:

Octet 3 or 4 up to 16 or 17									
Bit								**Meaning**	
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Data Type**	
0	0	0	0	0	0	0	1	1	Boolean
0	0	0	0	0	0	1	0	2	Integer8
0	0	0	0	0	0	1	1	3	Integer16
0	0	0	0	0	1	0	0	4	Integer32
0	0	0	0	0	1	0	1	5	Unsigned8
0	0	0	0	0	1	1	0	6	Unsigned16
0	0	0	0	0	1	1	1	7	Unsigned32
0	0	0	0	1	0	0	0	8	Floating Point
0	0	0	0	1	0	0	1	9	Visible String
0	0	0	0	1	0	1	0	10	Octet String
0	0	0	0	1	0	1	1	11	Date
0	0	0	0	1	1	0	0	12	Time Of Day
0	0	0	0	1	1	0	1	13	Time Difference
0	0	0	0	1	1	1	0	14	Time Of Day
0	0	0	0	1	1	1	1	15	Time Difference
0	0	0	1	0	0	0	0	16	
-	-	-	-	-	-	-	-	–	reserved
0	0	0	1	1	1	1	1	31	
0	0	1	0	0	0	0	0	32	Array Of Boolean
0	0	1	0	0	0	0	1	33	Array Of Integer8
0	0	1	0	0	0	1	0	34	Array Of Integer16
0	0	1	0	0	0	1	1	35	Array Of Integer32
0	0	1	0	0	1	0	0	36	Array Of Unsigned8
0	0	1	0	0	1	0	1	37	Array Of Unsigned16
0	0	1	0	0	1	1	0	38	Array Of Unsigned32
0	0	1	0	0	1	1	1	39	Array Of Floating Point

This information is saved in the GSD file. For projecting, the I/O module is selected in accordance with the item number using the configuration software contained in the hardware catalogue of the I/O module.

Modules are compiled in the table to make things simpler.

Module	Meaning	Example
Module	Configuration for digital I/O modules: A new byte is generated in the respective process image. The binary information of the I/O modules is mapped on the least significant bit of the byte.	750-400 2 DI/24 V DC/3.0 ms
	Configuration for analog I/O modules: Only the user data required for operating the I/O module are mapped in the appropriate process image area (input process image and/or output process image).	750-461 2 AI/RTD 750-550 2 AO/0-10 V
*-Module	Configuration for digital I/O modules. A module opened byte is fulfilled with binary information of the I/O module.	*750-400 2 DI/24 V DC/3.0 ms
RA module	Configuration of complex, in particular analog I/O modules. Input and output information inclusive CONTROL and STATUS byte is mapped in the respective process image area. This way, the register structure of the respective I/O modules can be accessed when parameterization is done via cyclic process data exchange.	750-461 2 AI/RTD RA 750-550 2 AO/0-10 V RA
PFC module	Allocation of the individual I/O module to the process image of the internal PLC. The process data is exclusively available for the PFC user program.	PFC 750-400 2 DI/24 V DC/3.0 ms

3.6.4.1 Bus Controller Modules

Order No.	Description	Module
750-833	no process data channel	0x00
750-833	2 byte process data channel	0xB1
750-833	4 byte process data channel	0xB3

3.6.4.2 I/O Modules

Note
You can find a list of all I/O modules with all possible identification bytes in chapter 5.3 “PROFIBUS Identification Bytes of I/O Modules “.

3.6.5 Example

A field bus node with a controller and 17 I/O modules should make the arrangement clear.

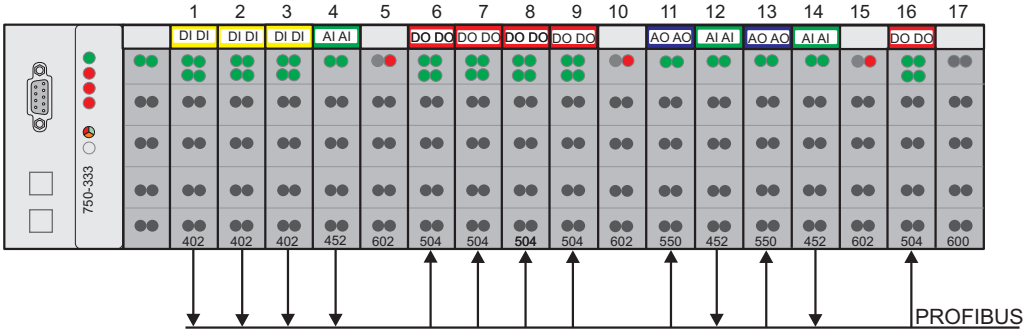


Fig. 3.6.5-12: Example application g012115x

No.	I/O Modules	Module Identification	PI Master *	
			Inputs	Outputs
1	Digital input	750-402 4 DI/24 V DC/3.0 ms	EB12.0	
	Digital input	0x10	EB12.1	
	Digital input		EB12.2	
	Digital input		EB12.3	
2	Digital input	*750-402 4 DI/24 V DC/3.0 ms	EB12.4	
	Digital input	0x00	EB12.5	
	Digital input		EB12.6	
	Digital input		EB12.7	
3	Digital input	750-402 4 DI/24 V DC/3.0 ms	EB13.0	
	Digital input	0x10	EB13.1	
	Digital input		EB13.2	
	Digital input		EB13.3	
4	Analog input	750-452 2 AI/0-20 mA/diff.	EW0	
	Analog input	0x51	EW2	
5	Power supply	Power supply	---	---
6	Digital output	750-504 4 DO/24 V DC/0.5 A		AB8.0
	Digital output	0x20		AB8.1
	Digital output			AB8.2
	Digital output			AB8.3
7	Digital output	*750-504 4 DO/24 V DC/0.5 A		AB8.4
	Digital output	0x00		AB8.5
	Digital output			AB8.6
	Digital output			AB8.7

No.	I/O Modules	Module Identification	PI Master *	
			Inputs	Outputs
8	Digital output	750-504 4 DO/24 V DC/0.5 A		AB9.0
	Digital output	0x20		AB9.1
	Digital output			AB9.2
	Digital output			AB9.3
9	Digital output	*750-504 4 DO/24 V DC/0.5 A		AB9.4
	Digital output	0x00		AB9.5
	Digital output			AB9.6
	Digital output			AB9.7
10	Potential supply	Potential supply	---	---
11	Analog output	750-550 2 AO/0-10 V		AW0
	Analog output	0x61		AW2
12	Analog input	750-452 2 AI/0-20 mA/diff.	EW4	
	Analog input	0x51	EW6	
13	Analog output	750-550 2 AO/0-10 V		AW4
	Analog output	0x61		AW6
14	Analog input	750-452 2 AI/0-20 mA/diff.	EW8	
	Analog input	0x51	EW10	
15	Power supply	Power supply	---	---
16	Digital output	750-504 4 DO/24 V DC/0.5 A		AB10.0
	Digital output	0x20		AB10.1
	Digital output			AB10.2
	Digital output			AB10.3
17	End module	End module	---	---

* The master addresses listed in the table correspond to the allocation of the process data given in the master configuration.

3.7 Parameterization of the Controllers

Before a data exchange can be performed between master and slave, a parameterization is required in addition to configuration.

The extended parameters (Extended User_Prm_Data) are provided via GSD files as selectable text in the configuration programs.

Description	Value	Meaning
Restart the internal bus after a fault	POWER ON RESET*) AUTORESET	Restart of the terminal bus following a fault, such as, for example, no termination module following an interruption of the supply immediately after overcoming the internal bus fault
I/O module diagnostics	released*) locked	The diagnostics information of all I/O modules with a diagnostics capability, for which the diagnostics is released are transferred to PROFIBUS DP master not transferred to PROFIBUS DP master
Process value display	INTEL MOTOROLA*)	Word or double word oriented process data, is transferred to PROFIBUS DP master in: „Little Endian Format“ „Big Endian Format“
Behavior in case of a PROFIBUS DP fault	Stop internal bus transmission Set output image to zero Freeze output image Write substitute values*) PFC fault strategy	In the case of a malfunction of the PROFIBUS DP communication the status of the connected output periphery can be influenced in various ways: The process data exchange on the internal bus is stopped, all outputs drop out after a module specific monitoring time of 100 ms all outputs are immediately reset all outputs maintain the last status before the malfunction all outputs switch a parameterizable substitute value PFC takes over the control via the output image
Reaction to an internal bus fault	Stop PROFIBUS data exchange*) Set input image to zero Freeze input image	In the event of a malfunction of an internal communication between field bus controller and I/O modules, such as, for example no termination module, the data exchange with the PROFIBUS master is stopped. the input information is set to zero the input information prevailing before the fault is maintained
PFC-Mapping of binary I/O modules	Process data and diagnostics data*) only process data	Using binary I/O modules containing redundant data on the internal data bus side, all data of the internal data bus image are mapped in the PFC image only the relevant data, that are connected to the periphery (no diagnostics data), are mapped in the PFC image
Projecting of virtual PFC modules	not possible*) possible	When projecting PFC modules using the PROFIBUS DP configuration tool, the modules cannot be parameterized as “not being connected” can be parameterized as “not being connected”

Description	Value	Meaning
Start-up via DPV1 channel		The cyclic data exchange
	locked *)	occurs after a successful parameterization and configuration
	released	occurs after a release on the acyclic C1 channel or C2 channel
Slot allocation		Assigning the slots for acyclic read and write is performed
	DPV1 compatible*) S7 compatible	according DPV1 format according S7 format

*) Default settings

The complete data block encompasses 26 parameterized bytes. The first 10 bytes are laid down via the DP and DPV1 standard. The others receive manufacturer specific parameters.

Byte No.	Bit No.	Value	Meaning
Standard Parameters			
0	0-7		Station status (see EN 50170)
1	0-7	2-255	Watchdog factor 1
2	0-7	2-255	Watchdog factor 2 Watchdog: The response monitoring is the result of Watchdog_Factor_1 x Watchdog_Factor_2 x 10 ms (1 ms)
3	0-7	11-255	Min T_{SDR}, Earliest time in T_{Bit} after which the slave can reply
4	0-7	183, 0xB7	Manufacturer identification (high byte)
5	0-7	86, 0x56	Manufacturer identification (low byte)
6	0-7		Group membership, Broad and multicast telegrams (SYNC, FREEZE)
7	0-7		DPV1 status 1 (see EN 50170)
8	0-7		DPV1 status 2 (see EN 50170)
9	0-7		DPV1 status 3 (see EN 50170)
Manufacturer Parameters			
10	0-7	0	Table 0, register 0 LB, reserved
11	0-7	0	Table 0, register 0 HB, reserved
12	0-7	0	Table 0, register 1 LB, reserved
13	0-7	0	Table 0, register 1 HB, reserved
14			Table 0, register 2 LB
	0	0	Device diagnostics locked
		1*)	Device diagnostics released
	1	0	Internal bus restart after fault: POWER-ON-RESET
		1*)	Internal bus restart after fault: AUTORESET
	2-7	0	reserved
15	0-7	0	Table 0, register 2 HB, reserved
16			Table 0, register 3 LB
	0-2	'011'	reserved
	3	0	Data format byte orientated I/O modules: INTEL
		1*)	Data format byte orientated I/O modules: MOTOROLA
	4-7	'1100'	reserved

Byte No.	Bit No.	Value	Meaning
17			Table 0, register 3 HB
	0-2	'000' '001' '010' '011' *) '100' '101' - '111'	Reaction to field bus fault: - stop internal bus transmission - set output image to zero - freeze output image - write substitute values - PFC fault strategy - not possible
	3-5	'000' *) '001' '010' '011' - '111'	Reaction to internal bus fault: - Exit data exchange - Set input image to zero - Freeze input image - not possible
	6-7	'00'	reserved
18	0-7	'1100.0011'	Table 0, register 4 LB, reserved
19	0-7	'0111.1111'	Table 0, register 4 HB, reserved
20	0 1 2-7	 0 1 0 1 '0000 00'	Table 100, Register 0 LB, reserved PFC mapping binary I/O modules - process and diagnostics data - only process data Configuration of virtual PFC modules - not possible - possible reserved
21			Table 100, register 0 HB, reserved
	0-3	'0001'	reserved
	4	 0 1	Start-up via DPV1-Kanal - locked - released
	5	 0 1	Slot allocation - DPV1 compatible - S7 compatible
	6-7	'00'	reserved
22	0-7	'0000.0000'	Table 100, register 1 LB, reserved
23	0-7	'0000.0000'	Table 100, register 1 HB, reserved
24	0-7	'0000.0000'	Table 100, register 2 LB, reserved
25	0-7	'0000.0000'	Table 100, register 2 HB, reserved

3.8 Configuration and Parameterization of the Modules

3.8.1 Process Data Channel of the Bus Controller

The process data channel , which has been parameterized as PFC interface and which requires 2-byte I/O data, is used for communication between **WAGO-I/O-*PRO*** and the run-time system of the field bus controller as described before. The register interface that has been implicitly allocated for the identification "750-833 4-byte process data channel “ and that must be explicitly activated for "750-833 2-byte process data channel “is not usable by the user and should not be used. If none of these interfaces are used, the process data channel can be projected with a length of zero.
(***750-833 No process data channel***).

Module	Identification hex	Identification dec
750-833 no process data channel	0x00	0
750-833 2 byte process data channel	0xB1	177
750-833 4 byte process data channel	0xB3	179

*) Default setting

Process Image	Input Image in [Byte]	Output Image in [Byte]
Internal bus	0	0
PROFIBUS DP	0*) / 2 / 4	0*) / 2 / 4
PFC (CPU)	0	0

*) Default settings

Parameter	Value	Meaning
Process data interface	PFC interface*) Register interface	The process data interface is for - program transfer - register communication

*) Default settings

Parameter								
Offset	Information							
0	7 *1*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *1*	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 Reg Intf	0 PFC Intf

$PFCIntf_0$	0	PFC interface switched off
	1	PFC interface switched on (default)
$RegIntf_1$	0	Register interface switched off (default)
	1	Register interface switched on
italic		Cannot be changed

Attention
One of these configuration modules has to be placed in the first module slot of the configuration table. Otherwise, the bus coupler signals a configuration error on the BUS-LED and in the status signal of the PROFIBUS diagnostics if it was released when parametering the bus coupler.

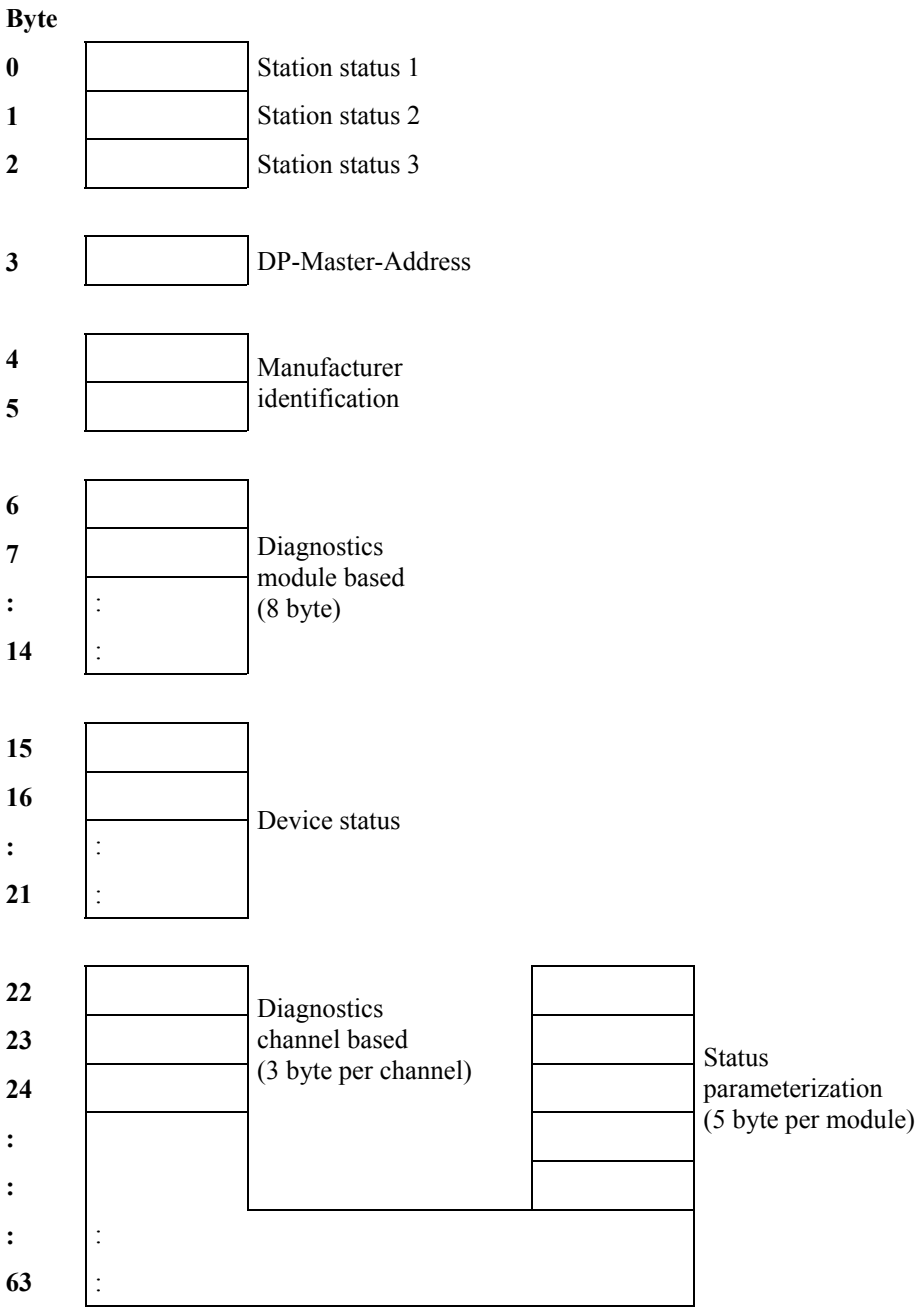
3.8.2 Parameterization of I/O Modules

Note
You can find a list of all I/O modules with all possible parameters in chapter 5.4 “Configuration and Parameterization of the I/O Modules”.

3.9 Diagnostics

The slave diagnostics of the controller comprises of a 6 bytes of standard diagnostics, 9 bytes of identification based diagnostics, 7 bytes of device status and up to 42 bytes of channel based diagnostics.

In the reply telegram of the diagnostics selection, in addition to the standard diagnostics, at least the identification based diagnostics and the device status are transmitted. This could be followed by up to 14 channel based diagnostics messages (3 bytes per message).



3.9.1 Stations Status 1 to 3

see EN 50170

3.9.2 PROFIBUS DP Master Address

The PROFIBUS DP master address is located in byte 3 of the slave diagnostics and contains the master address parameterized by the station and to which it has write and read access.

3.9.3 Manufacturer Identification

The manufacturer identification is located in bytes 4 and 5 and contains a 16 bit code, intended for the identification of the device or the device class.

3.9.4 Identification based Diagnostics

The identification based diagnostics comprises of a bit field containing a bit information for each connected module. The individual bit provides information about the current operating status. A 0 means no fault, a 1 indicates a faulty module status. The controller can be fitted with up to 63 modules, so that the identification based diagnostics including header covers 9 bytes from byte 6 to byte 14.

Byte	Information								Description
6	0	1	0	0	1	0	0	1	Header byte (9 byte identification based diagnostics incl. header)
7	7	6	5	4	3	2	1	0	Diagnostics allocation to Field bus controller (n = 0) I/O module n (n = 1 ... 63)
8	15	14	13	12	11	10	9	8	
9	23	22	21	20	19	18	17	16	
10	31	30	29	28	27	26	25	24	
11	39	38	37	36	35	34	33	32	
12	47	46	45	44	43	42	41	40	
13	55	54	53	52	51	50	49	48	
14	63	62	61	60	59	58	57	56	

3.9.5 Device Status

The device status includes the required overhead 7 byte and transmits internal status information as well as information relating to the internal bus, PROFIBUS DP and the PFC-RTS to the master or the higher ranking controls.

Byte	Information								Description
15	0	0	0	0	0	1	1	1	Header byte (7 byte status information incl. header)
16	1	0	1	0	0	0	0	0	Status type (manufacturer specific device status)
17	0	0	0	0	0	0	0	0	Slot number 0
18	0	0	0	0	0	0	0	0	Status differentiation (none)
19	q	q	n	n	n	n	n	n	Status message q – Status source '00' Internal status '01' Internal bus status '10' PROFIBUS DP status '11' PFC-RTS status n – Status number
20	x	x	x	x	x	x	x	x	Status argument
21	0	0	0	0	0	0	0	0	Reserved

3.9.5.1 Internal Status Messages and Arguments

Status Message	Status Argument	Description
0x00	0x00	No fault
0x01	0x00	EEPROM check sum fault / check sum fault in the flash parameter area
0x01	0x01	Overflow inline code buffer
0x01	0x02	Unknown data type
0x01	0x03	Module type for flash program memory could not be determined / is incorrect
0x01	0x04	Fault when writing in the FLASH memory
0x01	0x05	Fault when deleting the FLASH memory
0x01	0x06	Changed I/O modules configuration determined after AUTORESET
0x01	0x07	Fault when writing in the serial EEPROM
0x01	0x08	Invalid firmware
0x02	0x00	Incorrect table entry
0x07	N	Module at position n (n = 1...63) is not supported

3.9.5.2 Internal Bus Status Messages and Arguments

Status Message	Status Argument	Description
0x43	0xFF	At least one module cannot interpret an internal bus command
0x44	0x00	A data fault or a internal bus interruption exists behind the controller
0x44	n	An internal bus interruption exists behind module n
0x45	n	Fault during register communication with module n

3.9.5.3 PROFIBUS DP Status Messages and Arguments

Status Message	Status Argument	Description
0x81	0x01	Insufficient parameter data configuration data
0x81	0x02	Excessive parameterization data
0x82	n	Faulty n. parameterization byte
0x83	0x01	Insufficient configuration data
0x83	0x02	Excessive configuration data
0x84	n	Faulty n. configuration byte (module)
0x85	0x01	Maximum input data length exceeded
0x85	0x02	Maximum output data length exceeded
0x86	0x01	Compilate buffer overflow for DP process image
0x86	0x02	Compilate buffer overflow for PFC process image

3.9.5.4 PFC-RTS Status Messages and Arguments

Status Message	Status Argument	Description
0xC1	0x00	t. b. d.
0xC1	0x01	t. b. d.
0xC2	0x00	t. b. d.

3.9.6 Channel Based Diagnostics

The channel based diagnostics serves for detailing the identification based diagnostics. A structure is added to the device status for each faulty slot. This comprises of a header byte, a second byte that includes the signal type and the channel number and a third which describes the fault type and the channel organization.

<table>
<tr><th rowspan="2">Byte</th><th colspan="8">Information</th><th colspan="3" rowspan="2">Meaning</th></tr>
<tr><th>2^7</th><th>2^6</th><th>2^5</th><th>2^4</th><th>2^3</th><th>2^2</th><th>2^1</th><th>2^0</th></tr>
<tr><td rowspan="11">22 + n</td><td>1</td><td>0</td><td colspan="6">Slot</td><td colspan="3"></td></tr>
<tr><td colspan="8" rowspan="6"></td><td colspan="3">Slot 2 ... 64</td></tr>
<tr><td colspan="2">1</td><td>Slot 2</td></tr>
<tr><td colspan="2">2</td><td>Slot 3</td></tr>
<tr><td colspan="2">...</td><td></td></tr>
<tr><td colspan="2">63</td><td>Slot 64</td></tr>
<tr><td colspan="3">Header diagnostics channel based</td></tr>
<tr><td rowspan="11">23 + n</td><td colspan="2">Type of signal</td><td colspan="6">Signal channel</td><td colspan="3"></td></tr>
<tr><td colspan="8" rowspan="6"></td><td colspan="3">Signal channel 1 ... 8</td></tr>
<tr><td colspan="2">0</td><td>Signal channel 1</td></tr>
<tr><td colspan="2">1</td><td>Signal channel 2</td></tr>
<tr><td colspan="2">...</td><td></td></tr>
<tr><td colspan="2">7</td><td>Signal channel 8</td></tr>
<tr><td colspan="3">Type of signal</td></tr>
<tr><td>0</td><td>0</td><td></td></tr>
<tr><td>0</td><td>1</td><td>Input</td></tr>
<tr><td>1</td><td>0</td><td>Output</td></tr>
<tr><td>1</td><td>1</td><td>Input / Output</td></tr>
</table>

Byte	Information								Meaning			
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0				
24 + n	Type of channel			Fault number								
									Fault number 0 ... 31			
									0	0	0	No allocation
									0	0	1	1 bit
									0	1	0	2 bit
									0	1	1	4 bit
									1	0	0	1 byte
									1	0	1	1 word
									1	1	0	2 words

n : Offset of the diagnostics message in the diagnostics buffer

3.9.6.1 Fault Types of I/O Modules with Diagnostics Capability

The fault numbers 0 to 9 refer to standardized fault descriptions. The WAGO specific faults are arranged from fault number 17.

Fault Type		Meaning
STANDARDIZED	0	Not specified
	1	Short circuit
	2	Low voltage
	3	High voltage
	4	Overload
	5	Over temperature
	6	Line break
	7	Upper limit value exceeded
	8	Lower limit value exceeded
	9	Fault
	10 ... 15	Reserved
WAGO SPECIFIC	16	Reserved
	17	Field voltage fault
	18	Fuse fault
	19	Receiver buffer overflow
	20	Reserved
	21	Reserved
	22	Reserved
	23	Reserved
	24	The register of the I/O module, which is referenced by the type of signal and the signal channel, contains a diagnostics message
	25	Reserved
	26	Input fault
	27	Frame fault
	28	Cycle time fault
	29	I/O module fault
	31	Terminal fault

3.9.6.2 I/O Modules Fault Cases

Item Number	Channel Type	Fault Type	Meaning
750-418, 750-419, 750-425, 750-507, 750-522, 750-523, 750-532, 750-537	'001	0.1001'	Fault (broken wire, overload or short circuit, manual operation)
750-506	'001	0.0001' 0.0010' 0.0110' 0.1001'	Short circuit Overvoltage Line break Error
750-460, 750-461, 750-463, 750-469	'101	0.0110' 0.1000' 1.1111'	Broken wire Lower limit value gone below I/O module fault
750-452, 750-465, 750-467, 750-468, 750-472, 750-475, 750-477	'101	0.0111' 1.1111'	Upper limit value exceeded I/O module fault
750-453, 750-454, 750-455, 750-456, 750-457, 750-459, 750-466, 750-474, 750-476, 750-478, 750-479, 750-480, 750-483, 750-485, 750-492	'101	0.0111' 0.1000' 1.1111'	Upper limit value exceeded Lower limit value gone below I/O module fault
750-491	'101	0.0011' 0.0111' 1.1111'	Overvoltage Upper limit value exceeded I/O module fault
750-553, 750-555, 750-557, 750-559, 750-560	'101	0.1001'	Fault (short circuit, I/O module fault)
750-610, 750-611,	'001	1.0001' 1.0010'	Field voltage fault Fuse fault
750-630	'110	1.1010' 1.1011' 1.1111'	Input fault Frame fault I/O module fault
750-635	'110	0.1001' 1.1111'	Fault I/O module fault
750-637	'000	0.1001' 1.1111'	Fault Terminal fault
750-639	'110	0.0111' 0.1000'	Upper limit value exceeded Lower limit value gone below
750-641	'000	0.1001' 1.1011' 1.1101'	Fault Frame fault Bus error
750-642, 750-650, 750-651, 750-653	'110 ('000)	1.0011' 1.1111'	Receiver buffer overflow I/O module fault

Item Number	Channel Type	Fault Type	Meaning
750-655	'000	1.0001' 0.1001' 1.1101'	Field voltage fault Fault Bus error (AS interface flags offer more information)
750-660, 750-665, 750-666	'001 ('000)	1.1000' 1.1111'	The register of the I/O module, which is referenced by the type of signal and the signal channel, contains a diagnostics message. Terminal fault

3.9.7 Parameterization Status PROFIsafe

During start up of the DP Master, the **PROFIsafe** I/O modules receive the F-parameter data that is saved by a 16-bit CRC and is used to initialize the F-profile driver. If the parameterization failed, the F-profile driver will not be started in the F-I/O modules. The field bus coupler indicates the cause of the error via a status message (parameterization status).

The parameterization status is structured as follows:

Byte	Information								Meaning
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
22	0	0	0	0	0	1	0	1	Header byte (5 byte status information incl. header)
23	1	0	0	0	0	0	0	1	Status type = status message
24	Slot								**PROFIsafe** I/O module slot (range of values 2 ... 64)
25	0	0	0	0	0	0	0	0	Status differentiation = none
26	Fault number								**PROFIsafe** status message (range of values 64 ... 71)

3.9.7.1 PROFIsafe Parameterization Fault

PROFIsafe Parameterization Fault	
Fault Number	**Meaning**
64_{dez} (0x40)	Set **PROFIsafe** address does not agree with the parameterized F_DESTINATION_ADDR
65_{dez} (0x41)	Invalid parameterization of the F_DESTINATION_ADDR. The addresses 0x0000 and 0xFFFF are invalid.
66_{dez} (0x42)	Invalid parameterization of the F_SOURCE_ADDR. The addresses 0x0000 and 0xFFFF are invalid.
67_{dez} (0x43)	Invalid parameterization of the F_WDG_TIME. A monitoring time of 0 ms is invalid.
68_{dez} (0x44)	Invalid parameterization of the F_SIL. The required SIL class cannot be supported by the F-Module.
69_{dez} (0x45)	Invalid parameterization of the F_CRC_LENGTH. The required CRC length does not correspond to the generated one of the F-Module.
70_{dez} (0x46)	Invalid F-Parameter set version. The requested version does not correspond to the status of the F-Module.
71_{dez} (0x47)	The CRC, which was determined by the F module via the **PROFIsafe** parameters (CRC1), varies from the CRC1 transmitted in the parameterization telegram.
72_{dez} (0x48)	Reserved fault numbers, which are not allowed to be used or evaluated.
73_{dez} (0x49)	

3.10 Acyclic Communication According to DP/V1

In addition to cyclic data communication (PROFIBUS-DP standard in compliance with IEC 61158), PROFIBUS-DP also offers acyclic communication services as an option. These acyclic services can be performed parallel to cyclic data transfer. In process engineering applications, the optional services allow industrial devices to be operated using PROFIBUS-DP. Standard field devices and devices that require these optional extensions can be operated on the same bus. The data blocks are addressed via the slot number and the data block number (index) of the module. The meaning of the slots and indices can be set according to the device specifications. This way, the user can either access the data or the parameter sets within a field device. To distinguish between a standard DP and an acyclic DPV1 device, some keywords have been added to the GSD file.

Via GSD entries, a master can identify the services supported by the field device. In the parameter telegram, the K1 master activates the acyclic communication services of the device. In Data_Exchange mode, the K1 master can use the acyclic services of the slave that has been parameterized and configured by the master. Acyclic communication is no longer possible once cyclic data exchange has been interrupted.

The extended services are divided into master class 1/ slave functions (MSAC1) and master class 2/ slave functions (MSAC2).
Both initiating and aborting the communication channel is required so that the MSAC2 connection can be monitored. Monitoring a MSAC1 connection is done via the MSCY0 connection, which is always required.

The bus coupler supports the following acyclic services according to IEC61158-3:

MSAC1 Service	Requester	Responder
MSAC1_Read		x
MSAC1_Write		x

MSAC2 Service	Requester	Responder
MSAC2_Initiate		x
MSAC2_Abort	x	x
MSAC2_Read		x
MSAC2_Write		x

The MSAC1 services are released when the DP/V1 operation has been activated in the parameter data and the cyclic MSCY0 connection is established. The MSAC1 connection is closed when the DP data exchange is finished. In the event of cyclic or acyclic connection failures, both communication channels will be closed.

The MSAC2_Initiate service is used to open an acyclic MSAC2 connection. Once the connection has been established, it will be monitored by the C2 master. When failures occur, both the master and the slave can close the connection via MSAC2_Abort. The bus coupler is able to manage a MSAC2 connection.

3.10.1 Data Areas

Addressing the data areas, which can be written with MSAC1/2_Write or read with MSAC1/2_Read, is done via an index and the module number (Slot_Number) included in the configuration table. The modules begin at 0, i.e. the data areas of the bus coupler (basic device unit) can be accessed via slot number 0.

The range of indices is 0 to 254. The availability of individual data blocks (indices) depends on the module. The user data length of a MSAC1/2_Read and MSAC1/2_Write telegram cannot exceed 240 bytes. However, the actual lengths of the individual data areas depend on the modules.

Warning
All indices related to the register contents of complex I/O modules are read-only by default. Writing the register data when parameterizing the I/O module, e.g. setting the baud rate of serial interfaces 750-650, 750-651 and 750-653, is only possible for modules with the item number extension 750-???/**003-000**. In this case, the user specific registers R32 to R47 are activated for password-protected write access. Write protection to registers R32 – R47 are disabled by writing word 0x1235 into register R31. Write protection is restored by writing any other value into register R31.
Acyclic writing of process data from binary or analog output modules, for example, requires access only via MSAC2 connection. When supporting a MSAC1 connection, output information is overwritten by the cyclic DP data exchange or the PFC runtime system.
Note that valid write requests to the register structure can be positively acknowledged, even if the write protection has not been activated. In this case, however, the data to be written will not be transferred to the complex I/O module. The transfer only occurs if the write protection is reset.

3.10.1.1 Field Bus Coupler, Slots 0 and 1

Index	Meaning	Service Primitives / Data length [Byte]
00_D ... 07_D	Reserved for expansions	
08_D	Projected module arrangement	MSAC1/2_Read / 2 … 65
09_D	Physical module arrangement	MSAC1/2_Read / 2 … 65
10_D ... 99_D	Reserved for expansions	
128_D	Reserved for **WAGO-IO-*PRO***	MSAC1/2_Write / 1 ... 138 MSAC1/2_Read / 1 ... 138
129_D	Reserved for expansions	
130_D	Field bus input image	MSAC1/2_Read / 1 ... 240
131_D	Field bus input image	MSAC1/2_Read / 1 ... (244 –240)
132_D	Field bus output image	MSAC1/2_Read / 1 ... 240 MSAC1/2_Write / 1 ... 240
133_D	Field bus output image	MSAC1/2_Read / 1 ... (244-240) MSAC1/2_Write / 1 ... (244-240)
134_D	PFC input image part 1	MSAC1/2_Read / 1 ... 240
135_D	PFC input image part 2	MSAC1/2_Read / 1 ... 240
136_D	PFC input image part 3	MSAC1/2_Read / 1 ... (512-2*240)
137_D	PFC output image part 1	MSAC1/2_Read / 1 ... 240 MSAC1/2_Write / 1 ... 240
138_D	PFC output image part 2	MSAC1/2_Read / 1 ... 240 MSAC1/2_Write / 1 ... 240
139_D	PFC output image part 3	MSAC1/2_Read / 1 ... (512-2*240) MSAC1/2_Write / 1 ... (512-2*240)
140_D ... 254_D	Reserved for expansions	

3.10.2 Complex I/O Modules, Slots 1 ... 63

Index	Meaning
'xx00.0000'	Table register 0
...	...
'xx11.1010'	Table register 58
'xx11.1011'	All table registers
'xx11.1100'	Diagnostics data of the channel
'xx11.1101'	Input data of the channel
'xx11.1110'	Output data of the channel
'00xx.xxxx'	Table 0 / channel 1
'01xx.xxxx'	Table 1 / channel 2
'10xx.xxxx'	Table 2 / channel 3
'11xx.xxxx'	Table 3 / channel 4

3.10.2.1 Binary I/O Modules, Slots 1 ... 63

Index	Meaning
'xxx0.0000'	Channel 1
...	...
'xxx0.1111'	Channel 16
'000x.xxxx'	Diagnostics of the channel
'001x.xxxx'	Input information of the channel
'010x.xxxx'	Output information of the channel
'101x.xxxx' '1010.0000'	Input information of the module
'110x.xxxx' '1100.0000'	Output information of the module

Message ***"invalid index"*** is returned when accessing data areas not available from the module.

Examples: Accessing indices of a module that is not physically connected.

Accessing the data areas of the third channel while using a 2-channel module.

Requesting the input data of an output module.

Requesting the output data of an input module.

Requesting the diagnostics data of a module that has no diagnostics information.

The error message ***"invalid slot"*** is generated when addressing modules that are neither physically nor virtually (projected as not being connected) available.

When reading from indices (MSAC1/2_Read), the maximum PDU length that can be set is 240 bytes. The bus coupler/controller returns the actual amount of information from the respective index.

When writing to indices (MSAC1/2_Write), the maximum possible length of information to be written to the respective index must not be exceeded. Otherwise, the error message ***"invalid length while writing!"*** is reported by the bus coupler/controller.

Coding of Error Messages

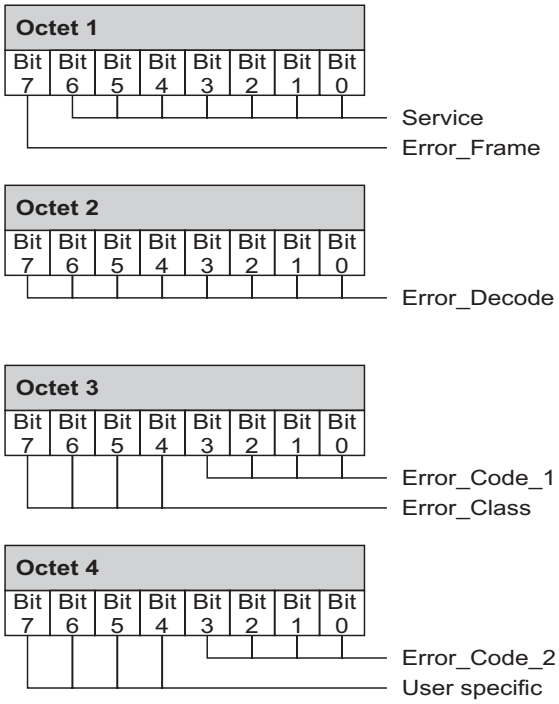


Abb. 3.10.2-13: Coding of error messages g012121e

Octet 2			
Error Decode	**Meaning**		
0 ... 127	Reserved		
128	***PROFIBUS-DP/V1***		
129 ... 254	Reserved		
255	PROFIBUS-FMS		

Octet 3			
Error_Class	**Meaning**	**Error_Code_1**	**Meaning**
0 - 9	Reserved		
10	Application errors	0	Error while reading
		1	Error while writing
		2	Module error
		3 ... 7	Reserved
		8	Version conflict
		9	Feature not supported
		10 ... 15	Application specific
11	***Access errors***	***0***	***Invalid index***
		1	***Incorrect length while writing***
		2	***Invalid slot***
		3	***Type conflict***
		4	Invalid area
		5	***Status conflict***
		6	***Access denied***
		7	Invalid scaling
		8	Invalid parameter
		9	Invalid type
		10 ... 15	Application specific
12	***Resource errors***	0	Read conflict
		1	Write conflict
		2	***Resource busy***
		3	Resource not available
		4 ... 7	Reserved
		8 ... 15	Application specific
13 ... 15	Reserved		

Octet 4			
Error_Code_2	**Meaning**	**User specific**	**Meaning**
0 ... 15	Reserved	0 ... 15	Application specific

Error codes returned by the bus coupler are shown in ***bold italic***.

Note
You can find a list of all I/O modules with all possible indices in chapter 5.5 “Acyclic Communication According to DP/V1“.

3.11 LED Signaling

For the on-site diagnostics the coupler has several LEDs, which display the operating status of the coupler or the complete node.

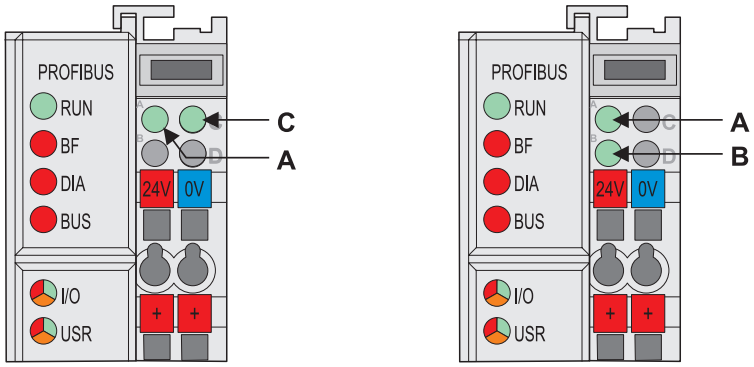


Fig. 3.10.2-14: Display element 750-833 g012107x

The upper four LEDs (RUN, BF, DIA, BUS) display the state of the PROFIBUS communication.

The lower LED (I/O) displays the internal state of the complete node.

The LEDs A and C or B display the status of the supply voltage.

3.11.1 Blink Code

A blink code displays detailed fault messages. A fault is cyclically displayed using up to 3 different blink sequences.

- The first blink sequence (approx. 10 Hz) indicates the fault display.
- After a pause a second blink sequence appears (approx. 1 Hz). The number of blink impulses gives the **fault code**.
- The third blink sequence (approx. 1 Hz) appears following a further pause. The number of blink pulses indicates the **fault argument**.

3.11.2 Field Bus Status

The upper four LEDs signal the operating status of the PROFIBUS communication.

LED	Color	Meaning
RUN	green	The RUN-LED shows the user whether the field bus controller is functioning correctly.
BF	red	The BF-LED indicates whether the communication is functioning via the PROFIBUS.
DIA	red	The DIA-LED indicates an external diagnostics.
BUS	red	The BUS-LED signals a projecting fault.

RUN	BF	DIA	BUS	Meaning	Remedy
off	off	off	off	No operating voltage to the coupler or a hardware fault is present.	Check the voltage supply for the bus coupler and replace the bus coupler if necessary.
on	on	*	off	PROFIBUS interface started, baud rate was not yet recognized.	Check to see whether the PROFIBUS is connected. Check to see whether the baud rate parameterized on the master is supported by the coupler. Replace the bus coupler because there is a hardware defect.
on	blinks	*	off	Baud rate recognized, station not yet parameterized and configured.	Check the configuration and the slave addresses. Load the coupler by switching the supply voltage off and on again.
on	blinks	on	blink code	Slave was incorrectly parameterized.	Evaluate the blink code
on	off	*	off	The coupler is exchanging data.	Ok
on	*	on	*	The coupler signals an existing diagnostics.	The data exchange is functioning without any problems so that you may obtain diagnostics information, for instance on a cable breakage in an analog input terminal.

* not relevant

3.11.3 Fault Message via Blink Code of the BUS LED

Fault Argument	Fault Description	Remedy
Fault Code 1: Fault in Parameterization Telegram		
1	Insufficient parameterization data The GSD file is defective or the parameter data was entered improperly.	Get in contact with WAGO support.
2	Excessive parameterization data The GSD file is defective or the parameter data was entered improperly.	Get in contact with WAGO support.
Fault Code 2: Fault in Parameterization Telegram		
n	Faulty parameterized byte n The n^{th} byte is defective.	Get in contact with WAGO support.
Fault Code 3: Fault in Configuration Telegram		
1	Insufficient configuration data.	Check the configuration because a terminal was probably forgotten in the configuration. Load the configuration and start the coupler by switching the supply voltage off and on again.
2	Excessive configuration data.	Check the configuration because a terminal was probably not plugged. Load the configuration and start the coupler by switching the supply voltage off and on again.
Fault Code 4: Fault in Configuration Telegram		
n	Configuration byte (module) n is faulty.	Check the n^{th} module in the configuration. Load the configuration and start the coupler by switching the supply voltage off and on again.
Fault Code 5: Faulty Data Length		
1	Maximum input data length exceeded (more than 128 byte input data).	Switch off the supply voltage of the coupler. Remove some terminals from the node and switch the supply voltage on again.
2	Maximum output data length exceeded (more than 128 byte output data).	Switch off the supply voltage of the coupler. Remove some terminals from the node and switch the supply voltage on again.
Fault Code 6: Compilate Buffer Overflow		
1	Compilate buffer overflow for DP process image.	Get in contact with WAGO support.
2	Compilate buffer overflow for PFC process image.	Get in contact with WAGO support.

3.11.4 Node Status

The I/O-LED indicates the node operation and signals the occurrence of a fault.

I/O	USR	Meaning
green	*	Data cycle on the internal bus
off	*	No data cycle on the internal bus
red	on	Bus coupler is in bootstrap mode or coupler hardware defective
red blinks	*	When starting: internal bus is initialized During operation: general internal bus fault
red blinks	*	Fault message during internal bus reset and internal fault
orange	*	FLASH access to bus device firmware

* not relevant

The coupler starts after switching on the supply voltage. The I/O-LED flashes red. Following a fault free run up the I/O-LED changes to green steady light. In the case of a fault the I/O-LED continues blinking red. The fault is cyclically displayed with the blink code.

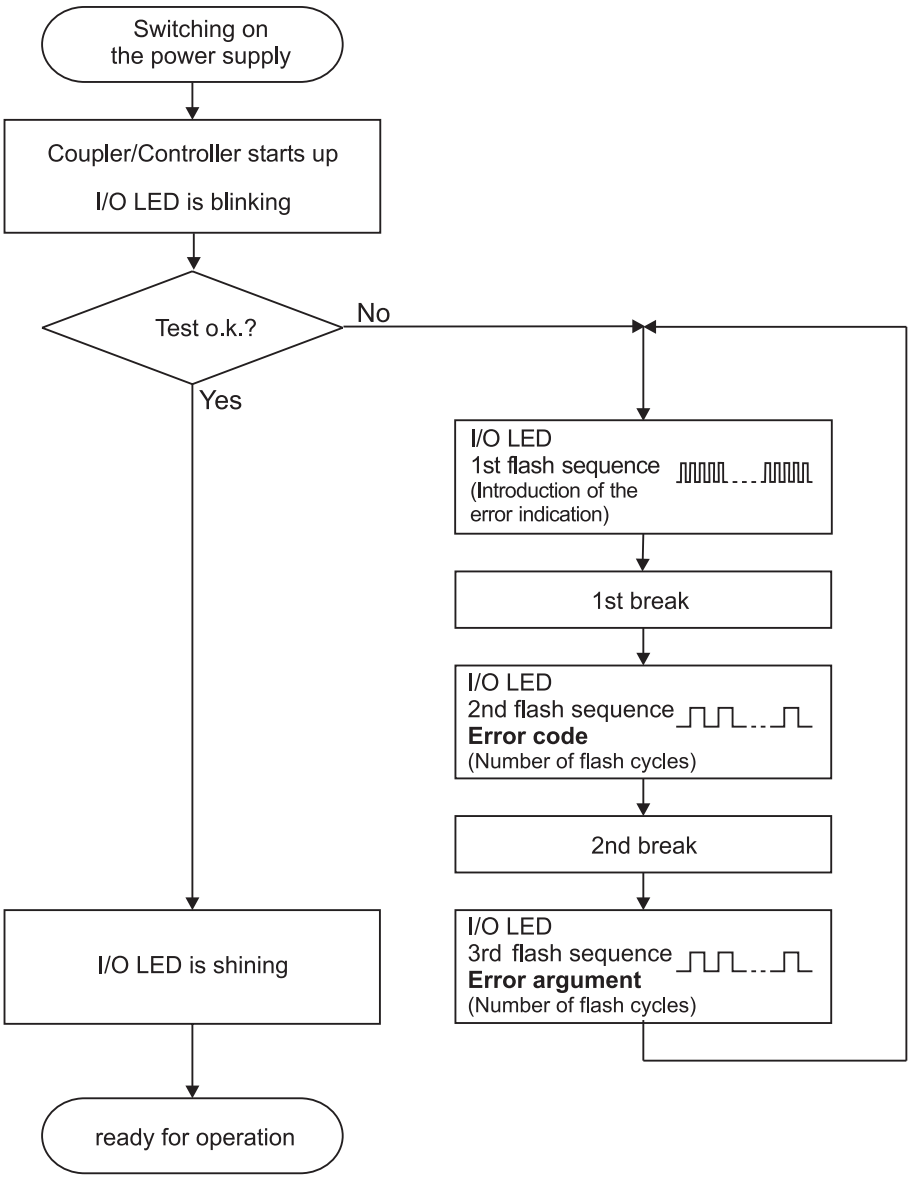


Fig. 3.11.4-15: Signaling the LED node status g012111e

After overcoming a fault, restart the coupler by switching off and on the supply voltage.

3.11.5 Fault Message via Blink Code of the I/O LED

Fault Argument	Fault Description	Remedy
Fault Code 1: Hardware and Configuration Fault		
-	Check sum fault in parameter area of the flash memory.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
1	Overflow of the internal buffer memory for the inline code.	Switch off the supply voltage of the node. Reduce the number of modules and switch on the supply voltage again. In case that the fault still exists, replace the coupler.
2	Unknown data type	Detect faulty I/O module as follows: turn off the power supply. Place the end module in the middle of the field bus node. Turn the power supply on again. - If the LED is still blinking, turn off the power supply and place the end module in the middle of the first half of the node (towards the coupler). - If the LED doesn't blink, turn off the power supply and place the end module in the middle of the second half of the node (away from the coupler). Turn the power supply on again. Repeat this procedure until the faulty I/O module is detected. Replace the faulty I/O module. Ask about a firmware update for the field bus coupler.
3	Module type of the flash program memory could not be determined / is incorrect.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
4	Fault during writing in the flash memory.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
5	Fault when deleting the FLASH memory.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
6	Changed I/O module configuration found after AUTORESET.	Restart the coupler by switching the supply voltage off and on again.
7	Fault when writing in the serial EEPROM.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.

Fault Argument	Fault Description	Remedy
8	Invalid hardware-firmware combination.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
9	Invalid check sum in the serial EEPROM.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
10	Fault when initializing the serial EEPROM.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
11	Fault when reading the serial EEPROM.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
12	Exceeded time when accessing the serial EEPROM.	Switch off the supply voltage of the node. Replace the coupler and switch on the supply voltage again.
14	Maximum number of gateway modules or mailbox modules exceeded.	Reduce the number of correspondent modules up to a valid number.
Fault Code 2: not used		
-	-	-
Fault Code 3: Internal Bus Protocol Fault		
-	Internal bus communication defective, incorrect module not identifiable.	If the field bus node comprises internal system supply module (750-613), make sure first that the power supply of these modules is functioning. This is indicated by the status LEDs. If all I/O modules are connected correctly or if the field bus node does not comprise 750-613 module you can detect the faulty I/O module as follows: turn off the power supply of the node. Place the end module in the middle of the field bus node. Turn the power supply on again. - If the LED is still blinking, turn off the power supply and place the end module in the middle of the first half of the node (towards the coupler). - If the LED doesn't blink, turn off the power supply and place the end module in the middle of the second half of the node (away from the coupler). Turn the power supply on again. Repeat this procedure until the faulty I/O module is detected. Replace the faulty I/O module. If there is only one module on the coupler and the LED is blinking, either this module or the coupler is defective. Replace the defective component.

Fault Argument	Fault Description	Remedy
Fault Code 4: Physical Internal Bus Fault		
-	Data fault on internal bus or internal bus interruption on coupler.	Switch off the supply voltage of the node. Place an I/O module with process data behind the coupler and note the error argument after the power supply is turned on. If none error argument is given by the I/O LED, replace the coupler. Otherwise detect faulty I/O module as follows: turn off the power supply. Place the end module in the middle of the field bus node. Turn the power supply on again. - If the LED is still blinking, turn off the power supply and place the end module in the middle of the first half of the node (towards the coupler). - If the LED doesn't blink, turn off the power supply and place the end module in the middle of the second half of the node (away from the coupler). Turn the power supply on again. Repeat this procedure until the faulty I/O module is detected. Replace the faulty I/O module. If there is only one module on the coupler and the LED is blinking, either this module or the coupler is defective. Replace the defective component.
n*	Internal bus interrupted after I/O module n with process data.	Switch off the supply voltage of the node. Replace the $(n+1)^{th}$ module with process data and switch on the supply voltage again.
Fault Code 5: Initialization Fault		
n*	Register communication fault during internal bus initialization.	Switch off the supply voltage of the node. Replace the n^{th} module with process data and switch on the supply voltage again.
Fault Code 6: not used		
-	-	-
Fault Code 7: not used		
-	-	-
Fault Code 8: not used		
-	-	-

Fault Argument	Fault Description	Remedy
Fault Code 9: CPU Exception Fault		
1	Invalid device instruction	A failure occurs in the program flow. Get in contact with WAGO support.
2	Stack overflow	A failure occurs in the program flow. Get in contact with WAGO support.
3	Stack underflow	A failure occurs in the program flow. Get in contact with WAGO support.
4	Invalid event (NMI)	A failure occurs in the program flow. Get in contact with WAGO support.
Fault Code 10: PLC Program Processing Fault		
1	Invalid offset address for digital inputs	Correct the offset address in the related function block.
2	Invalid offset address for digital outputs	Correct the offset address in the related function block.

* The number of blink pulses (n) indicates the position of the I/O module. I/O modules without data are not counted (e.g. supply module without diagnostics).

Example: The 13th I/O module has been removed.	
1.	The I/O-LED generates a fault display with the first blink sequence (approx. 10 Hz).
2.	The first pause is followed by the second blink sequence (approx. 1 Hz). The I/O-LED blinks four times and thus signals the fault code 4 (internal bus data fault).
3.	The third blink sequence follows the second pause. The I/O-LED blinks twelve times. The fault argument 12 means that the internal bus is interrupted after the 12th I/O module.

3.11.6 Supply Voltage Status

There are two green LED in the controller supply section. The left upper LED (A) indicates the status of the system supply. The right upper LED (C) or the left lower LED (B) signals the supply to the field side (the LED position depends on manufacturer).

LED A	Meaning	Remedy
green	System supply is ok	
off	System supply failed	Check the power supply (24 V and 0 V)

LED C or B	Meaning	Remedy
green	Field supply is ok	
off	Field supply failed	Check the power supply (24 V and 0 V)

3.12 Fault Behavior

3.12.1 Field Bus Failure

A field bus failure is given when the master cuts-out or the bus cable is interrupted. A fault in the master can also lead to a field bus failure.

The red BF-LED lights up.

The failure of the field bus can activate the parameterizable substitute value of the I/O modules. During projecting of the inputs and outputs a substitute value can be laid down for each channel.

Substitute Value Strategy	Value (Bit orientated) Digital Output Modules	Value (Byte orientated) Digital Input Modules
Minimum value	0	0 or 4 mA, 0 V
Maximum value	1	20 mA, 10 V
Substitute value	0 or 1	0/4 ... 20 mA, -10 ... +10 V
PFC takes over	The local PFC application takes over the output data	
Stop internal bus	Behavior determined by I/O module	

The values are entered in the output process image by the coupler. With the I/O modules with byte orientated data width, e.g. with the pulse width module, the substitute value is determined via the value range.

The process data is transmitted as soon as the field bus is active again and the outputs in the node are set accordingly.

3.12.2 Internal Bus Fault

An internal bus fault is created, for example, if an I/O module is removed. If this fault occurs during operation the output modules behave in the same manner as an I/O module stop. The input process image is set in accordance with the projected strategy.

The I/O-LED blinks red. The slave generates a detailed diagnostics message.

Once the internal bus fault has been overcome the coupler starts up again automatically in accordance with the parameterized restart behavior. The transfer of the process data is then resumed and the node outputs are correspondingly set.

3.13 Technical Data

System Data	
Number of I/O modules	96 with repeater
Number of I/O points	ca. 6000 (master dependent)
Transfer medium	Cu cable acc. EN 50170
Bus segment length	100 m ... 1200 m (baud rate dependent / cable dependent)
Transmission rate	9.6 kbaud ... 12 Mbaud
Transmission time for 10 modules each with 32 DI and 32 DO	typ. 1 ms max. 3.3 ms
Bus connection	1 x D-Sub 9; female
Programming IEC 61131-3	**WAGO-I/O-*PRO*** AWL, KOP, FUP, ST, AS
Technical Data	
Number of I/O modules	63
Protocol	DP / DPV1
Field bus - Input process image - Output process image	 max. 244 byte (128 byte up to SW 02) max. 244 byte (128 byte up to SW 02)
Configuration	via PC or controls
Voltage supply	DC 24 V (-15 % / + 20 %)
Input current$_{max}$	500 mA at 24 V
Internal system supply module efficiency	87 %
Internal current consumption	200 mA at 5 V
Total current for I/O modules	1800 mA at 5 V
Voltage via power jumper contacts	DC 24 V (-15 % / + 20 %)
Current via power jumper contact$_{max}$	DC 10 A
Dimensions w x h* x l *from upper edge of DIN 35 rail	51 mm x 65 mm x 100 mm
Weight	ca. 195 g
Standards and Regulations	
PROFIBUS-Norm	EN 50 170
EMC-Immunity to interference (CE)	acc. to EN 50082-2 (96)
EMC-Emission of interference (CE)	acc. to EN 50081-2 (94)

Approvals		
	cULus (UL508)	
	ABS (American Bureau of Shipping)	
	BV (Bureau Veritas)	
	DNV (Det Norske Veritas)	Cl. B
	GL (Germanischer Lloyd)	Cat. A, B, C, D
	KR (Korean Register of Shipping)	
	LR (Lloyd's Register)	Env. 1, 2, 3, 4
	NKK (Nippon Kaiji Kyokai)	
	RINA (Registro Italiano Navale)	
	cULus (UL1604)	Class I Div2 ABCD T4A
	DEMKO	II 3 G EEx nA II T4
	Conformity Marking	

Accessories	
GDS data	Download: http://www.wago.com
Mini WSB quick marking system	

More Information
Detailed references to the approvals are listed in the document "Overview Approvals WAGO-I/O-SYSTEM 750", which you can find on the CD ROM ELECTRONICC Tools and Docs (Item No.: 0888-0412) or at http://www.wago.com under Documentation → WAGO-I/O-SYSTEM 750 → System Description.

4 Field Bus Communication

4.1 PROFIBUS

4.1.1 Description

PROFIBUS is an open field bus standard, laid down in the European Standard EN 50 170, Vol. 2 (also IEC).

PROFIBUS DP has been designed for a fast and efficient data exchange between a control (PLC / PC) and decentralized peripheral equipment, for example sensors and actuators, digital or analog input and output modules.

A DP System consists of a master and up to 124 slaves:

Master: A DP Master exchanges the data with the slaves via PROFIBUS DP and controls the bus. It transfers the data between a supervisory control and the decentralized peripheral equipment.

Slave: DP Slaves are the link to the field side. They edit the input data of the peripheral equipment for the communication with the master and output the Master data to the peripheral equipment.

PROFIBUS uses the master/slave method for data transmission. The master cyclically reads the input data from the slaves and cyclically writes the output data to the slaves. PROFIBUS DP V1 also supports an acyclic data exchange. PROFIBUS DP has baud rates from 9.6 kbaud up to 12 Mbaud.

PROFIBUS DP features:

- fast system response times
- high immunity to interference
- master and slave diagnostic
- single slaves may fail or be turned off without the field bus operations being interrupted
- Every configuration is stored in the master.
- Every slave has a manufacturer-specific identifier that has been assigned by the PNO (PROFIBUS Nutzerorganisation).
- The slaves are described in the GSD files. The GSD file is imported into the configuration software which makes the configuration of the slave easier.

Further Information
The PNO provides further documentation for its members on internet:
- Technical descriptions
- Guidelines

http://www.profibus.com/

4.1.2 Wiring

On the PROFIBUS with RS 485 transmission technology all devices are connected in a line structure. The bus line comprises of a twisted and screened pair of wires.

The field bus line is specified in EN 50 170 as a line type A and must provide certain line parameters. The line type B also described in the EN 50 170 is an old type and should no longer be used.

Parameter	Value
Wave resistance	135 ... 165 Ω
Operating capacity	< 30 pF/m
Loop resistance	110 Ω/km
Wire diameter*)	> 0.64 mm
Wire cross section*)	> 0.34 mm²

*) The wire cross sections used must conform with connection possibilities on the bus plug.

Line type A allows maximum line lengths for a bus segment dependent upon the transmission speed.

Transmission speed		Max. bus segment length
9.6 / 19.2 / 45.45 / 93.75	kBaud	1200 m
187.5	kBaud	1000 m
500	kBaud	400 m
1500	kBaud	200 m
3000 / 6000 / 12000	kBaud	100 m

The plugs 750-960, 750-970 offered by WAGO provide the possibility that arriving and departing data cables can be directly connected to the plug. In this manner drop cables are avoided and the bus plug can be connected to or disconnected from the bus at any time without interrupting the data traffic. A cut-in type bus connection is integrated in these plugs. Due to the capacitive load of the subscribers and the resulting generated line reflection the connection plugs used should have integrated length inductivity. This is indispensable for transmission rates of > 1.5 MBaud.

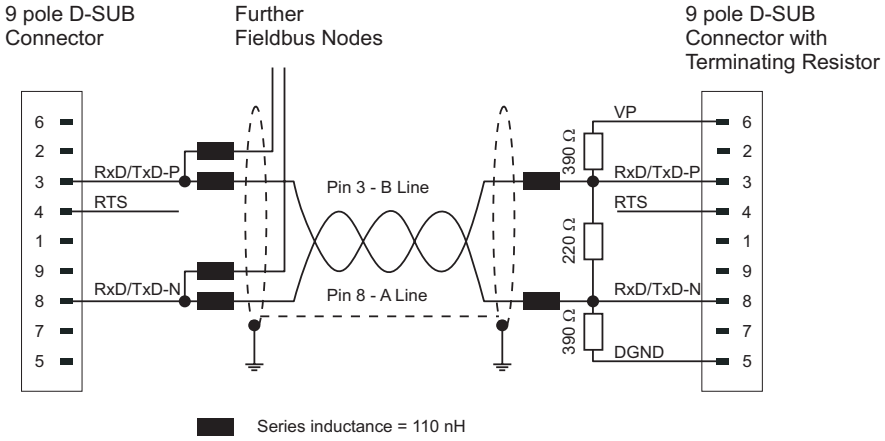


Fig. 4-1: Bus connection g1xx302e

Note

When connecting the subscriber ensure that the data lines are not mixed up. The bus termination at the start and end of the bus line must be installed. The bus connection requires the supply voltage VP from the device. For this reason ensure that the slave unit installed on the bus termination, is always supplied with voltage.
Due to the integrated length inductivity in the connection plug ensure that the plug is installed without connected field devices as the missing capacity of the device could cause transmission faults.

In order to achieve a high disturbance resistance of the system against electromagnetic radiated interference ensure that a screened PROFIBUS cable is used. Where possible connect the screen at both ends with good conduction and using large surface area screen clips. In addition ensure that the cables are laid separated from all power line cables if possible. With a data rate of ≥ 1.5 Mbit/s ensure that spur lines are avoided.

Further Information
The PNO provides further documentation for its members on internet. Cable specification information can be obtained from, for example, the „Installation Guideline for PROFIBUS-FMS/DP", 2.112.

http://www.profibus.com/

Note
WAGO Kontakttechnik GmbH & Co. KG offers this screen connection system for the optimum connection between field bus screening and function earth.

5 I/O Modules

5.1 Overview

All listed bus modules, in the overview below, are available for modular applications with the WAGO-I/O-SYSTEM 750.
For detailed information on the I/O modules and the module variations, please refer to the manuals for the I/O modules.
You will find these manuals on CD ROM „ELECTRONICC Tools and Docs“ (Item No.: 0888-0412) or at http://www.wago.com under Documentation.

Additional Information
Current information on the modular WAGO-I/O-SYSTEM is available at http://www.wago.com.

5.1.1 Digital Input Modules

Tab. 5-1: Digital input modules

DI DC 5 V	
750-414	4 Channel, DC 5 V, 0.2 ms, 2- to 3-conductor connection, high-side switching
DI DC 5(12) V	
753-434	8 Channel, DC 5(12) V, 0.2 ms, 1-conductor connection, high-side switching
DI DC 24 V	
750-400, 753-400	2 Channel, DC 24 V, 3.0 ms, 2- to 4-conductor connection; high-side switching
750-401, 753-401	2 Channel, DC 24 V, 0.2 ms, 2- to 4-conductor connection; high-side switching
750-410, 753-410	2 Channel, DC 24 V, 3.0 ms, 2- to 4-conductor connection; high-side switching
750-411, 753-411	2 Channel, DC 24 V, 0.2 ms, 2- to 4-conductor connection; high-side switching
750-418, 753-418	2 Channel, DC 24 V, 3.0 ms, 2- to 3-conductor connection; high-side switching; diagnostics and confirmation
750-419	2 Channel, DC 24 V, 3.0 ms, 2- to 3-conductor connection; high-side switching; diagnostics
750-421, 753-421	2 Channel, DC 24 V, 3.0 ms, 2- to 3-conductor connection; high-side switching; diagnostics
750-402, 753-402	4 Channel, DC 24 V, 3.0 ms, 2- to 3-conductor connection; high-side switching

750-432, 753-432	4 Channel, DC 24 V, 3.0 ms, 2-conductor connection; high-side switching
750-403, 753-403	4 Channel, DC 24 V, 0.2 ms, 2- to 3-conductor connection; high-side switching
750-433, 753-433	4 Channel, DC 24 V, 0.2 ms, 2-conductor connection; high-side switching
750-422, 753-422	4 Channel, DC 24 V, 2- to 3-conductor connection; high-side switching; 10 ms pulse extension
750-408, 753-408	4 Channel, DC 24 V, 3.0 ms, 2- to 3-conductor connection; low-side switching
750-409, 753-409	4 Channel, DC 24 V, 0.2 ms, 2- to 3-conductor connection; low-side switching
750-430, 753-430	8 Channel, DC 24 V, 3.0 ms, 1-conductor connection; high-side switching
750-431, 753-431	8 Channel, DC 24 V, 0.2 ms, 1-conductor connection; high-side switching
750-436	8 Channel, DC 24 V, 3.0 ms, 1-conductor connection; low-side switching
750-437	8 Channel, DC 24 V, 0.2 ms, 1-conductor connection; low-side switching
DI AC/DC 24 V	
750-415, 753-415	4 Channel, AC/DC 24 V, 2-conductor connection
750-423, 753-423	4 Channel, AC/DC 24 V, 2- to 3-conductor connection; with power jumper contacts
DI AC/DC 42 V	
750-428, 753-428	4 Channel, AC/DC 42 V, 2-conductor connection
DI DC 48 V	
750-412, 753-412	2 Channel, DC 48 V, 3.0ms, 2- to 4-conductor connection; high-side switching
DI DC 110 V	
750-427, 753-427	2 Channel, DC 110 V, configurable high-side or low-side switching
DI AC 120 V	
750-406, 753-406	2 Channel, AC 120 V, 2- to 4-conductor connection; high-side switching
DI AC 120(230) V	
753-440	4 Channel, AC 120(230) V, 2-conductor connection; high-side switching
DI AC 230 V	
750-405, 753-405	2 Channel, AC 230 V, 2- to 4-conductor connection; high-side switching

DI NAMUR	
750-435	1 Channel, NAMUR EEx i, proximity switch acc. to DIN EN 50227
750-425, 753-425	2 Channel, NAMUR, proximity switch acc. to DIN EN 50227
750-438	2 Channel, NAMUR EEx i, proximity switch acc. to DIN EN 50227
DI Intruder Detection	
750-424, 753-424	2 Channel, DC 24 V, intruder detection

5.1.2 Digital Output Modules

Tab. 5-2: Digital output modules

DO DC 5 V	
750-519	4 Channel, DC 5 V, 20mA, short-circuit-protected; high-side switching
DO DC 12(14) V	
753-534	8 Channel, DC 12(14) V, 1A, short-circuit-protected; high-side switching
DO DC 24 V	
750-501, 753-501	2 Channel, DC 24 V, 0.5 A, short-circuit-protected; high-side switching
750-502, 753-502	2 Channel, DC 24 V, 2.0 A, short-circuit-protected; high-side switching
750-506, 753-506	2 Channel, DC 24 V, 0.5 A, short-circuit-protected; high-side switching; diagnostics
750-507, 753-507	2 Channel, DC 24 V, 2.0 A, short-circuit-protected; high-side switching; diagnostics; no longer available, replaced by 750-508!
750-508	2 Channel, DC 24 V, 2.0 A, short-circuit-protected; high-side switching; diagnostics; replacement for 750-507
750-535	2 Channel, DC 24 V, EEx i, short-circuit-protected; high-side switching
750-504, 753-504	4 Channel, DC 24 V, 0.5 A, short-circuit-protected; high-side switching
750-531, 753-531	4 Channel, DC 24 V, 0.5 A, short-circuit-protected; high-side switching
750-532	4 Channel, DC 24 V, 0.5 A, short-circuit-protected; high-side switching; diagnostics
750-516, 753-516	4 Channel, DC 24 V, 0.5 A, short-circuit-protected; low-side switching
750-530, 753-530	8 Channel, DC 24 V, 0.5 A, short-circuit-protected; high-side switching
750-537	8 Channel, DC 24 V, 0.5 A, short-circuit-protected; high-side switching; diagnostics
750-536	8 Channel, DC 24 V, 0.5 A, short-circuit-protected; low-side switching
DO AC 120(230) V	
753-540	4 Channel, AC 120(230) V, 0.25 A, short-circuit-protected; high-side switching

DO AC/DC 230 V	
750-509, 753-509	2 Channel solid state relay, AC/DC 230 V, 300 mA
750-522	2 Channel solid state relay, AC/DC 230 V, 500 mA, 3 A (< 30 s)
DO Relay	
750-523	1 Channel, AC 230 V, AC 16 A, potential-free, 1 make contact
750-514, 753-514	2 Channel, AC 125 V , AC 0.5 A , DC 30 V, DC 1 A, potential-free, 2 changeover contacts
750-517, 753-517	2 Channel, AC 230 V, 1 A, potential-free, 2 changeover contacts
750-512, 753-512	2 Channel, AC 230 V, DC 30 V, AC/DC 2 A, non-floating, 2 make contacts
750-513, 753-513	2 Channel, AC 230 V, DC 30 V, AC/DC 2 A, potential-free, 2 make contacts

5.1.3 Analog Input Modules

Tab. 5-3: Analog input modules

AI 0 - 20 mA	
750-452, 753-452	2 Channel, 0 - 20 mA, differential input
750-465, 753-465	2 Channel, 0 - 20 mA, single-ended
750-472, 753-472	2-Channel, 0 - 20 mA, 16 bit, single-ended
750-480	2-Channel, 0 - 20 mA , differential input
750-453, 753-453	4 Channel, 0 - 20 mA, single-ended
AI 4 - 20 mA	
750-454, 753-454	2 Channel, 4 - 20 mA, differential input
750-474, 753-474	2 Channel, 4 - 20 mA, 16 bit, single-ended
750-466, 753-466	2 Channel, 4 - 20 mA, single ended
750-485	2 Channel, 4 - 20 mA, EEx i, single-ended
750-492, 753-492	2 Channel, 4 - 20 mA, isolated differential input
750-455, 753-455	4 Channel, 4 - 20 mA, single-ended
AI 0 - 1 A	
750-475, 753-475	2-Channel, 0 - 1 A AC/DC, differential input
AI 0 - 5 A	
750-475/020-000, 753-475/020-000	2-Channel, 0 - 5 A AC/DC, differential input

AI 0 - 10 V	
750-467, 753-467	2 Channel, DC 0 - 10 V, single-ended
750-477, 753-477	2 Channel, AC/DC 0 - 10 V, differential input
750-478, 753-478	2 Channel, DC 0 - 10 V, single-ended
750-459, 753-459	4 Channel, DC 0 - 10 V, single-ended
750-468	4 Channel, DC 0 - 10 V, single-ended
AI DC ± 10 V	
750-456, 753-456	2 Channel, DC ± 10 V, differential input
750-479, 753-479	2 Channel, DC ± 10 V, differential measurement input
750-476, 753-476	2 Channel, DC ± 10 V, single-ended
750-457, 753-457	4 Channel, DC ± 10 V, single-ended
AI DC 0 - 30 V	
750-483, 753-483	2 Channel, DC 0 -30 V, differential measurement input
AI Resistance Sensors	
750-461, 753-461	2 Channel, resistance sensors, PT100 / RTD
750-481/003-000	2 Channel, resistance sensors, PT100 / RTD, EEx i
750-460	4 Channel, resistance sensors, PT100 / RTD
AI Thermocouples	
750-462	2 Channel, thermocouples, line break detection, sensor types: J, K, B, E, N, R, S, T, U
750-469, 753-469	2 Channel, thermocouples, line break detection, sensor types: J, K, B, E, N, R, S, T, U, L
AI Others	
750-491	1 Channel for resistor bridges (strain gauge)

5.1.4 Analog Output Modules

Tab. 5-4: Analog output modules

AO 0 - 20 mA	
750-552, 753-552	2 Channel, 0 - 20 mA
750-585	2 Channel, 0 - 20 mA, EEx i
750-553, 753-553	4 Channel, 0 - 20 mA
AO 4 - 20 mA	
750-554, 753-554	2 Channel, 4 - 20 mA
750-554, 753-554	4 Channel, 4 - 20 mA
AO DC 0 - 10 V	
750-550, 753-550	2 Channel, DC 0 - 10 V
750-560	2 Channel, DC 0 - 10 V, 10 bit, 100 mW, 24 V
750-559, 753-559	4 Channel, DC 0 - 10 V
AO DC ± 10 V	
750-556, 753-556	2 Channel, DC ± 10 V
750-557, 753-557	4 Channel, DC ± 10 V

5.1.5 Special Modules

Tab. 5-5: Special modules

Counter Modules	
750-404, 753-404	Up / down counter, DC 24 V, 100 kHz
750-638, 753-638	2 Channel, up / down counter, DC 24 V/ 16 bit / 500 Hz
Frequency Measuring	
750-404/000-003, 753-404/000-003	Frequency measuring
Pulse Width Module	
750-511	2-channel pulse width module, DC 24 V, short-circuit-protected, high-side switching
Distance and Angle Measurement Modules	
750-630	SSI transmitter interface
750-631	Incremental encor interface, differential inputs
750-634	Incremental encor interface, DC 24 V
750-637	Incremental encor interface RS 422, cam outputs
750-635, 753-635	Digital pulse interface, for magnetostrictive distance sensors
Serial Interfaces	
750-650, 753	Serial interface RS 232 C
750-653, 753	Serial interface RS 485
750-651	TTY-Serial interface, 20 mA Current Loop
750-654	Data exchange module
DALI / DSI Master Module	
750-641	DALI / DSI master module
AS interface Master Module	
750-655	AS interface master module
Radio Receiver Module	
750-642	Radio receiver EnOcean
MP Bus Master Module	
750-643	MP bus (multi point bus) master module
Vibration Monitoring	
750-645	2 Channel vibration velocity / bearing condition monitoring VIB I/O

PROFIsafe Modules	
750-660/000-001	8FDI 24V DC PROFIsafe; PROFIsafe 8 channel digital input module
750-665/000-001	4FDO 0.5A / 4FDI 24V DC PROFIsafe; PROFIsafe 4 channel digital input and output module
750-666/000-001	1FDO 10A / 2FDO 0.5A / 2FDI 24V PROFIsafe; PROFIsafe power switch module
RTC Module	
750-640	RTC module
KNX / EIB TP1 Module	
750-646	KNX / EIB /TP1 module – device mode / router mode

5.1.6 System Modules

Tab. 5-6: System modules

Module Bus Extension	
750-627	Module bus extension, end module
750-628	Module bus extension, coupler module
DC 24 V Power Supply Modules	
750-602	DC 24 V, passive
750-601	DC 24 V, max. 6.3 A, without diagnostics, with fuse-holder
750-610	DC 24 V, max. 6.3 A, with diagnostics, with fuse-holder
750-625	DC 24 V, EEx i, with fuse-holder
DC 24 V Power Supply Modules with bus power supply	
750-613	Bus power supply, 24 V DC
AC 120 V Power Supply Modules	
750-615	AC 120 V, max. 6.3 A without diagnostics, with fuse-holder
AC 230 V Power Supply Modules	
750-612	AC/DC 230 V without diagnostics, passive
750-609	AC 230 V, max. 6.3 A without diagnostics, with fuse-holder
750-611	AC 230 V, max. 6.3 A with diagnostics, with fuse-holder
Filter Modules	
750-624	Filter module, field side power supply
750-626	Filter module, system and field side power supply
Field Side Connection Module	
750-603, 753-603	Field side connection module, DC 24 V
750-604, 753-604	Field side connection module, DC 0 V
750-614, 753-614	Field side connection module, AC/DC 0 ... 230 V
Separation Modules	
750-616	Separation module
750-621	Separation module with power contacts
Binary Spacer Module	
750-622	Binary spacer module
End Module	
750-600	End module, to loop the internal bus

5.2 Design of the Process Data for PROFIBUS-DP

Depending on how the coupler is parameterized, the status bytes (S), control bytes (C) and data bytes (D0...Dn) of the byte or word orientated modules are transmitted via PROFIBUS in Motorola or Intel format.

Attention
For the meaning of input and output bits or bytes of the individual I/O module please refer to the corresponding I/O module description.

5.2.1 2 DI I/O Modules

750-400, 750-401, 750-405, 750-406, 750-407, 750-410, 750-411, 750-412, 750-413, 750-416, 750-427, 750-435, 750-438

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes (not possible)	-	-
No	2	0

5.2.2 2 DI I/O Modules with Diagnostics

750-419, 750-425 (1 bit diagnostics / channel)

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes	4	0
No	2	0

750-418 (1 bit diagnostics / channel, 1 bit confirmation / channel)

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes	4	2
No	2	2

5.2.3 4 DI I/O Modules

750-402, 750-403, 750-408, 750-409, 750-414, 750-415, 750-422, 750-423, 750-424, 750-428, 750-432, 750-433

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes (not possible)	-	-
No	4	0

5.2.4 8 DI I/O Modules

750-430, 750-431, 750-436, 750-437

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes (not possible)	-	-
No	8	0

5.2.5 16 DI I/O Modules

750-4xx

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes (not possible)	-	-
No	16	0

5.2.6 2 DO I/O Modules

750-501, 750-502, 750-509, 750-512, 750-513, 750-514, 750-517, 750-535

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes (not possible)	-	-
No	0	2

5.2.7 2 DO I/O Modules with Diagnostics

750-507, 750-522, 750-523 (1 bit diagnostics / channel)

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes	2	2
No	0	2

750-506 (2 bit diagnostics / channel)

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes	4	2
No	0	2

5.2.8 4 DO I/O Modules

750-504, 750-516, 750-519, 750-531

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes (not possible)	-	-
No	0	4

5.2.9 4 DO I/O Module with Diagnostics

750-532 (1 bit diagnostics / channel)

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes	4	4
No	0	4

5.2.10 8 DO I/O Modules

750-530, 750-536

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes (not possible)	-	-
No	0	8

5.2.11 8 DO I/O Module with Diagnostics

750-537 (1 bit diagnostics / channel)

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes	8	8
No	0	8

5.2.12 16 DO I/O Modules

750-5xx

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes (not possible)	-	-
No	0	16

5.2.13 Power Supply Modules

750-610, 750-611 (with diagnostics)

Process Image Length in [Bit]		
Diagnostics information in the PROFIBUS process image	Input	Output
Yes	2	0
No	0	0

5.2.14 2 AI I/O Modules

750-452, 750-454, 750-456, 750-461, 750-462, 750-465, 750-466, 750-467, 750-469, 750-472, 750-474, 750-475, 750-476, 750-477, 750-478, 750-479, 750-480, 750-483, 750-485, 750-491, 750-492

Process Image Length in [Byte]				
Register communication possible		Input		Output
Yes		6		6
No		4		0
Mapping with Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D1	D1	D0	D0
	D0	D0	D1	D1
Channel 2	S1	C1	S1	C1
	D3	D3	D2	D2
	D2	D2	D3	D3
Mapping without Register Communication				
	MOTOROLA		INTEL	
	Input	Output	Input	Output
Channel 1	D1	-	D0	-
	D0	-	D1	-
Channel 2	D3	-	D2	-
	D2	-	D3	-

5.2.15 4 AI I/O Modules

750-453, 750-455, 750-457, 750-459, 750-460, 750-463, 750-468

Process Image Length in [Byte]				
Register communication possible		Input	Output	
Yes		12	12	
No		8	0	
Mapping with Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D1	D1	D0	D0
	D0	D0	D1	D1
Channel 2	S1	C1	S1	C1
	D3	D3	D2	D2
	D2	D2	D3	D3
Channel 3	S2	C2	S2	C2
	D5	D5	D4	D4
	D4	D4	D5	D5
Channel 4	S3	C3	S3	C3
	D7	D7	D6	D6
	D6	D6	D7	D7
Mapping without Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	D1	-	D0	-
	D0	-	D1	-
Channel 2	D3	-	D2	-
	D2	-	D3	-
Channel 3	D5	-	D4	-
	D4	-	D5	-
Channel 4	D7	-	D6	-
	D6	-	D7	-

5.2.16 2 AO I/O Modules

750-550, 750-552, 750-554, 750-556, 750-560, 750-585

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	6		6	
No	0		4	
Mapping with Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D1	D1	D0	D0
	D0	D0	D1	D1
Channel 2	S1	C1	S1	C1
	D3	D3	D2	D2
	D2	D2	D3	D3
Mapping without Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	-	D1	-	D0
	-	D0	-	D1
Channel 2	-	D3	-	D2
	-	D2	-	D3

5.2.17 4 AO I/O Modules

750-551, 750-553, 750-555, 750-557, 750-559

Process Image Length in [Byte]				
Register communication possible		Input	Output	
Yes		12	12	
No		0	8	
Mapping with Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D1	D1	D0	D0
	D0	D0	D1	D1
Channel 2	S1	C1	S1	C1
	D3	D3	D2	D2
	D2	D2	D3	D3
Channel 3	S2	C2	S2	C2
	D5	D5	D4	D4
	D4	D4	D5	D5
Channel 4	S3	C3	S3	C3
	D7	D7	D6	D6
	D6	D6	D7	D7
Mapping without Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	-	D1	-	D0
	-	D0	-	D1
Channel 2	-	D3	-	D2
	-	D2	-	D3
Channel 3	-	D5	-	D4
	-	D4	-	D5
Channel 4	-	D7	-	D6
	-	D6	-	D7

5.2.18 Counter Modules

750-404

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	6		6	
No (not possible)	-		-	
Mapping				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S	C	S	C
	-	-	-	-
	D3	D3	D0	D0
	D2	D2	D1	D1
	D1	D1	D2	D2
	D0	D0	D3	D3

750-638

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	6		6	
No (not possible)	-		-	
Mapping				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D1	D1	D0	D0
	D0	D0	D1	D1
Channel 2	S1	C1	S1	C1
	D3	D3	D2	D2
	D2	D2	D3	D3

5.2.19 PWM Module

750-511

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	6		6	
No (not possible)	-		-	
Mapping				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D1	D1	D0	D0
	D0	D0	D1	D1
Channel 2	S1	C1	S1	C1
	D3	D3	D2	D2
	D2	D2	D3	D3

5.2.20 Stepper Controller

750-639

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	4		4	
No (not possible)	-		-	
Mapping				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	-	-	-	-
	D1	D1	D0	D0
	D0	D0	D1	D1

5.2.21 SSI Encoder Interface

750-630

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	6		6	
No	4		0	
Mapping with Register Communication (Alternative Format, Default Setting)				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D1	D1	D0	D0
	D0	D0	D1	D1
	-	-	-	-
	D3	D3	D2	D2
	D2	D2	D3	D3
Mapping with Register Communication (Standard-Format)				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	-	-	-	-
	D3	D3	D0	D0
	D2	D2	D1	D1
	D1	D1	D2	D2
	D0	D0	D3	D3
Mapping without Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	D3	-	D0	-
	D2	-	D1	-
	D1	-	D2	-
	D0	-	D3	-

5.2.22 Incremental Encoder Interfaces

750-631, 750-634, 750-637

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	6		6	
No (not possible)	-		-	
Mapping				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D1	D1	D0	D0
	D0	D0	D1	D1
	S1*	C1*	S1*	C1*
	D3	D3	D2	D2
	D2	D2	D3	D3

* The 2. CONTROL or STATUS byte is just available with 750-637.

5.2.23 Digital Impulse Interface

750-635

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	4		4	
No (not possible)	-		-	
Mapping				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D0	D0	D0	D0
	D1	D1	D1	D1
	D2	D2	D2	D2

5.2.24 Serial Interface

750-650, 750-651, 750-653 (default setting)

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes (not possible)	-		-	
No	4		4	
Mapping				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S	C	S	C
	D0	D0	D0	D0
	D1	D1	D1	D1
	D2	D2	D2	D2
	D3 (6)	D3 (6)	D3 (6)	D3 (6)
	D4 (6)	D4 (6)	D4 (6)	D4 (6)

750-650/003-0??, 750-651/003-0??, 750-653/003-0?? (settable)

Process Image Length in [Byte]				
Register communication possible	Input		Output	
Yes	4/6		4/6	
No (not possible)	-		-	
Mapping				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D0	D0	D0	D0
	D1	D1	D1	D1
	D2 (4, 6) *2)	D2 (4, 6) *2)	D2 (4, 6) *2)	D2 (4, 6) *2)
	D3 (6) *2)	D3 (6) *2)	D3 (6) *2)	D3 (6) *2)
	D4 (6) *2)	D4 (6) *2)	D4 (6) *2)	D4 (6) *2)

*2) The numbers in brackets stand for the projected data length.

5.2.25 Data Exchange Module

750-654

Process Image Length in [Byte]				
Register communication possible		Input	Output	
Yes		6	6	
No		4	4	
Mapping with Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D0	D0	D1	D1
	D1	D1	D0	D0
	D2	D2	D2	D2
	D3	D3	D4	D4
	D4	D4	D3	D3
Mapping without Register Communication				
Data format	MOTOROLA		INTEL	
I/O area	Input	Output	Input	Output
Channel 1	D0	D0	D1	D1
	D1	D1	D0	D0
	D3	D3	D4	D4
	D4	D4	D3	D3

5.2.26 DALI/DSI Master

750-641

Process Image Length in [Byte]				
Register communication possible		Input		Output
Yes		6		6
No (not possible)		-		-
Mapping				
Data format	MOTOROLA / INTEL			
I/O area	Input	Output	Input	Output
Channel 1	S0	C0	S0	C0
	D0	D0	D0	D0
	D1	D1	D1	D1
	D2	D2	D2	D2
	D3	D3	D3	D3
	D4	D4	D4	D4

5.2.27 AS Interface Master

750-655

Process Image Length in [Byte]		
Register communication possible	Input	Output
Yes	12, 20, 24, 32, 40, 48	12, 20, 24, 32, 40, 48
No (not possible)	-	-
Mapping		
Data format	MOTOROLA / INTEL	
I/O area	Input	Output
Channel 1	S0	C0
	-	-
	D0	D0
	D1	D1
	…	…
	D(n-1)	D(n-1)
	Dn	Dn
	n = 9, 17, 21, 29, 37, 45	

5.2.28 PROFIsafe I/O Modules

750-660, 750-665, 750-666

Process Image Length in [Byte]		
Register communication possible	Input	Output
Yes (not possible)	-	-
No	5	5

Mapping		
Data format	MOTOROLA / INTEL	
I/O area	Input	Output
Channel 1	D0	D0
	STATUS (**PROFIsafe**)	CONTROL (**PROFIsafe**)
	Consecutive number F-Module	Consecutive number F-Host
	CRC F-Module High Byte	CRC F-Host High Byte
	CRC F-Module Low Byte	CRC F-Host Low Byte

5.3 PROFIBUS Identification Bytes of I/O Modules

5.3.1 Binary Input Modules

Order No.	Description	Module	*-Module	PFC Module
750-400	2 DI/24 V DC/3.0 ms	0x10	0x00	0x00
750-401	2 DI/24 V DC/0.2 ms	0x10	0x00	0x00
750-402	4 DI/24 V DC/3.0 ms	0x10	0x00	0x00
750-403	4 DI/24 V DC/0.2 ms	0x10	0x00	0x00
750-405	2 DI/230 V AC/10 ms	0x10	0x00	0x00
750-406	2 DI/120 V AC/10 ms	0x10	0x00	0x00
750-407	2 DI/230 V AC/10 ms	0x10	0x00	0x00
750-408	4 DI/24 V DC/3.0 ms	0x10	0x00	0x00
750-409	4 DI/24 V DC/0.2 ms	0x10	0x00	0x00
750-410	2 DI/24 V DC/3.0 ms	0x10	0x00	0x00
750-411	2 DI/24 V DC/0.2 ms	0x10	0x00	0x00
750-412	2 DI/48 V DC/3.0 ms	0x10	0x00	0x00
750-413	2 DI/48 V DC/0.2 ms	0x10	0x00	0x00
750-414	4 DI/5 V DC/0.2 ms	0x10	0x00	0x00
750-415	4 DI/24 V AC/DC/20 ms	0x10	0x00	0x00
750-416	2 DI/120-230 V AC	0x10	0x00	0x00
750-418	2 DI/24 V DC DIA ACK	0x30	0x00	0x00
750-419	2 DI/24 V DC DIA	0x10	0x00	0x00
750-422	4 DI/24 V DC	0x10	0x00	0x00
750-423	4 DI/24 V AC/DC/50ms	0x10	0x00	0x00
750-424	4 DI/24 V DC	0x10	0x00	0x00
750-425	2 DI/24 V DC NAMUR	0x10	0x00	0x00
750-427	2 DI/110 V DC	0x10	0x00	0x00
750-428	4 DI/42 V AC/DC	0x10	0x00	0x00
750-430	8 DI/24 V DC/3.0 ms	0x10	-	0x00
750-431	8 DI/24 V DC/0.2 ms	0x10	-	0x00
750-432	4 DI/24 V DC/3.0 ms	0x10	0x00	0x00
750-433	4 DI/24 V DC/0.2 ms	0x10	0x00	0x00
750-435	1 DI/24 V DC Eex i	0x10	0x00	0x00
750-436	8 DI/24 V DC/3.0 ms	0x10	-	0x00
750-437	8 DI/24 V DC/0.2 ms	0x10	-	0x00
750-438	2 DI/24 V DC EEx i	0x10	0x00	0x00
750-4dd	2 DI	0x10	0x00	0x00
750-4dd	2 DI/DIA	0x10	0x00	-
750-4dd	4 DI	0x10	0x00	0x00
750-4dd	8 DI	0x10	-	0x00

5.3.2 Binary Output Modules

Order No.	Description	Module	*-Module	PFC Module
750-501	2 DO/24 V DC/0.5 A	0x20	0x00	0x00
750-502	2 DO/24 V DC/2.0 A	0x20	0x00	0x00
750-504	4 DO/24 V DC/0.5 A	0x20	0x00	0x00
750-506	2 DO/4 DIA-DI/DIA	0x30	-	-
750-506	2 DO/24 V DC/0.5 A DIA	0x20	0x00	0x00
750-507	2 DO/2 DIA-DI/DIA	0x30	-	-
750-507	2 DO/24 V DC/2.0 A DIA	0x20	0x00	0x00
750-509	2 DO/230 V AC/0.3 A	0x20	0x00	0x00
750-512	2 DO Relay/250 V AC	0x20	0x00	0x00
750-513	2 DO Relay/250 V AC	0x20	0x00	0x00
750-514	2 DO Relay/125 V AC	0x20	0x00	0x00
750-516	4 DO/24 V DC/0.5 A	0x20	0x00	0x00
750-517	2 DO Relay/230 V AC	0x20	0x00	0x00
750-519	4 DO/5 V DC/20 mA	0x20	0x00	0x00
750-522	2 DO/2 DIA-DI/DIA	0x30	-	-
750-522	2 DO/230V AC/0.5 A DIA	0x20	0x00	0x00
750-523	1 DO/230V AC/16 A DIA	0x30	0x00	0x00
750-523	1 DO/230V AC/16 A DIA	0x20	0x00	0x00
750-530	8 DO/24 V DC/0.5 A	0x20	-	0x00
750-531	4 DO/24 V DC/0.5 A	0x20	0x00	0x00
750-532	4 DO/4 DIA-DI/DIA	0x30	-	-
750-532	4 DO/24 V DC/0.5 A DIA	0x20	0x00	0x00
750-535	2 DO/24V DC/0.5A EEx i	0x20	0x00	0x00
750-536	8 DO/24 V DC/0.5 A	0x20	-	0x00
750-537	8 DO/8 DIA-DI/DIA	0x30	-	-
750-537	8 DO/24 V DC/0.5 A DIA	0x20	-	0x00
750-5dd	2 DO	0x20	0x00	0x00
750-5dd	2 DO/2 DIA-DI/2 DIA	0x30	-	-
750-5dd	2 DO/2 DIA	0x20	0x00	0x00
750-5dd	2 DO/4 DIA	0x30	-	-
750-5dd	2 DO/4 DIA	0x20	0x00	0x00
750-5dd	4 DO	0x20	0x00	0x00
750-5dd	8 DO	0x20	-	0x00
Buerkert 8644 monost.	2 DO	0x20	0x00	0x00
Buerkert 8644 bistab.	4 DO	0x20	0x00	0x00
Buerkert 8644 monost.	8 DO	0x20	-	0x00

5.3.3 Supply Modules

Order No.	Description	Module	*-Module	PFC Module
750-610	P-Supply 24 V DC/DIA	0x00	-	-
750-610	Dia. Im PA	0x10	0x00	0x00
750-611	P-Supply 230 V AC/DIA	0x00	-	-
750-611	Dia. Im PA	0x10	0x00	0x00

5.3.4 Analog Input Modules

Order No.	Description	Module	RA-Module	PFC Module
750-452	2 AI/0-20 mA/diff.	0x51	0xF2	0x00
750-453	4 AI/0-20 mA/SE	0x53	0xF5	0x00
750-454	2 AI/4-20 mA/diff.	0x51	0xF2	0x00
750-455	4 AI/4-20 mA/SE	0x53	0xF5	0x00
750-456	2 AI/+/-10 V/diff.	0x51	0xF2	0x00
750-457	4 AI/+/-10 V/SE	0x53	0xF5	0x00
750-459	4 AI/0-10 V/SE	0x53	0xF5	0x00
750-460	4 AI/RTD	0x53	0xF5	0x00
750-461	2 AI/RTD	0x51	0xF2	0x00
750-462	2 AI/TC	0x51	0xF2	0x00
750-463	4 AI/TC	0x53	0xF5	0x00
750-465	2 AI/0-20 mA/SE	0x51	0xF2	0x00
750-466	2 AI/4-20 mA/SE	0x51	0xF2	0x00
750-467	2 AI/0-10 V/SE	0x51	0xF2	0x00
750-468	4 AI/0-10 V/SE	0x53	0xF5	0x00
750-469	2 AI/TC/OCM	0x51	0xF2	0x00
750-472	2 AI/0-20 mA/OVLP	0x51	0xF2	0x00
750-474	2 AI/4-20 mA/OVLP	0x51	0xF2	0x00
750-475	2 AI/0-1 A AC/DC	0x51	0xF2	0x00
750-476	2 AI/+/-10 V	0x51	0xF2	0x00
750-477	2 AI/0-10 V AC/DC	0x51	0xF2	0x00
750-478	2 AI/0-10 V	0x51	0xF2	0x00
750-479	2 AI/+/-10 V	0x51	0xF2	0x00
750-480	2 AI/0-20 mA	0x51	0xF2	0x00
750-481	2AI/RTD EEx i	0x51	0xF2	0x00
750-483	2 AI/0-30 V DC	0x51	0xF2	0x00
750-485	2 AI/4-20 mA EEx i	0x51	0xF2	0x00
750-491	1 AI/DMS-Bridge	0x51	0xF2	0x00
750-492	2 AI/4-20 mA	0x51	0xF2	0x00
750-4aa	2 AI	0x51	0xF2	0x00
750-4aa	4 AI	0x53	0xF5	0x00

5.3.5 Analog Output Modules

Order No.	Description	Module	RA-Module	PFC Module
750-550	2 AO/0-10 V	0x61	0xF2	0x00
750-551	4 AO/0-10 V	0x63	0xF5	0x00
750-552	2 AO/0-20 mA	0x61	0xF2	0x00
750-553	4 AO/0-20 mA	0x63	0xF5	0x00
750-554	2 AO/4-20 mA	0x61	0xF2	0x00
750-555	4 AO/4-20 mA	0x63	0xF5	0x00
750-556	2 AO/+/-10 V	0x61	0xF2	0x00
750-557	4 AO/+/-10 V	0x63	0xF5	0x00
750-559	4 AO/0-10 V	0x63	0xF5	0x00
750-560	2 AO/0-10 V 100mW	0x61	0xF2	0x00
750-585	2 AO/4-20 mA EEx i	0x61	0xF2	0x00
750-5aa	2 AO	0x61	0xF2	0x00
750-5aa	4 AO	0x63	0xF5	0x00

5.3.6 Special Modules

Order No.	Description	Module	RA-Module	PFC Module
750-404	V/R-Counter	0xF2		0x00
750-511	2 DO 24 V DC/PWM	0xF2		0x00
750-630	SSI-Interface	0x93	0x00	
750-631	Encoder-Interface	0xB5		0x00
750-634	Encoder-Interface	0xB5		0x00
750-635	Dig. Impulse-Interface	0xB3		0x00
750-637	Encoder-Interface	0xF2		0x00
750-638	V/R-Counter	0xF2		0x00
750-639	2 DO 24 V DC/FM/PT	0xF1		0x00
750-641	DALI/DSI-Master	0xB5		0x00
750-650	RS232C-Intf. 5 Byte	0xB5		0x00
750-650	RS232C-Intf. 3 Byte	0xB3		0x00
750-651	TTY-Interface 5 Byte	0xB5		0x00
750-651	TTY-Interface 3 Byte	0xB3		0x00
750-653	RS485-Interface 5 Byte	0xB5		0x00
750-653	RS485-Interface 3 Byte	0xB3		0x00
750-654	Data exchange module	0xF1		0x00
750-654	Data exchange module RA	0xF2		0x00
750-655	ASI-Master 12 byte PA	0xC2,0x8B,0x8B,0x0A,0x0A		0x00
750-655	ASI-Master 20 byte PA	0xC2,0x93,0x93,0x0A,0x0A		0x00
750-655	ASI-Master 24 byte PA	0xC2,0x97,0x97,0x0A,0x0A		0x00
750-655	ASI-Master 32 byte PA	0xC2,0x9F,0x9F,0x0A,0x0A		0x00
750-655	ASI-Master 40 byte PA	0xC2,0xA7,0xA7,0x0A,0x0A		0x00
750-655	ASI-Master 48 byte PA	0xC2,0xAF,0xAF,0x0A,0x0A		0x00
750-660	8 FDI/24 V DC	0xC4,0x84,0x84, 0x05,0x0A,0x05,0x0A	-	0x00
750-665	4 FDO 0.5A/4 FDI 24V DC	0xC4,0x84,0x84, 0x05,0x0A,0x05,0x0A	-	0x00
750-666	1 FDO 10A/2 FDI/2 FDO	0xC4,0x84,0x84, 0x05,0x0A,0x05,0x0A	-	0x00
750-6aa	SF	0xF2		0x00

5.3.7 Field Bus Variables

Some modules are allocated for the field bus variables.

5.3.7.1 PFC Input Variables in the Field Bus Output Process Image

The following PFC modules are allocated up to SW 02:

Field Bus Variable	PFC Module	Field Bus Variable	PFC Module
1 byte PFC Inputs	0xA0	2 byte PFC Inputs	0xA1
3 byte PFC Inputs	0xA2	4 byte PFC Inputs	0xA3
5 byte PFC Inputs	0xA4	6 byte PFC Inputs	0xA5
7 byte PFC Inputs	0xA6	8 byte PFC Inputs	0xA7
9 byte PFC Inputs	0xA8	10 byte PFC Inputs	0xA9
11 byte PFC Inputs	0xAA	12 byte PFC Inputs	0xAB
13 byte PFC Inputs	0xAC	14 byte PFC Inputs	0xAD
15 byte PFC Inputs	0xAE	16 byte PFC Inputs	0xAF
17 byte PFC Inputs	0x80,0x90	18 byte PFC Inputs	0x80,0x91
19 byte PFC Inputs	0x80,0x92	20 byte PFC Inputs	0x80,0x93
21 byte PFC Inputs	0x80,0x94	22 byte PFC Inputs	0x80,0x95
23 byte PFC Inputs	0x80,0x96	24 byte PFC Inputs	0x80,0x97
25 byte PFC Inputs	0x80,0x98	26 byte PFC Inputs	0x80,0x99
27 byte PFC Inputs	0x80,0x9A	28 byte PFC Inputs	0x80,0x9B
29 byte PFC Inputs	0x80,0x9C	30 byte PFC Inputs	0x80,0x9D
31 byte PFC Inputs	0x80,0x9E	32 byte PFC Inputs	0x80,0x9F
33 byte PFC Inputs	0x80,0xA0	34 byte PFC Inputs	0x80,0xA1
35 byte PFC Inputs	0x80,0xA2	36 byte PFC Inputs	0x80,0xA3
37 byte PFC Inputs	0x80,0xA4	38 byte PFC Inputs	0x80,0xA5
39 byte PFC Inputs	0x80,0xA6	40 byte PFC Inputs	0x80,0xA7
41 byte PFC Inputs	0x80,0xA8	42 byte PFC Inputs	0x80,0xA9
43 byte PFC Inputs	0x80,0xAA	44 byte PFC Inputs	0x80,0xAB
45 byte PFC Inputs	0x80,0xAC	46 byte PFC Inputs	0x80,0xAD
47 byte PFC Inputs	0x80,0xAE	48 byte PFC Inputs	0x80,0xAF
49 byte PFC Inputs	0x80,0xB0	50 byte PFC Inputs	0x80,0xB1
51 byte PFC Inputs	0x80,0xB2	52 byte PFC Inputs	0x80,0xB3
53 byte PFC Inputs	0x80,0xB4	54 byte PFC Inputs	0x80,0xB5
55 byte PFC Inputs	0x80,0xB6	56 byte PFC Inputs	0x80,0xB7
57 byte PFC Inputs	0x80,0xB8	58 byte PFC Inputs	0x80,0xB9
59 byte PFC Inputs	0x80,0xBA	60 byte PFC Inputs	0x80,0xBB
61 byte PFC Inputs	0x80,0xBC	62 byte PFC Inputs	0x80,0xBD
63 byte PFC Inputs	0x80,0xBE	64 byte PFC Inputs	0x80,0xBF

Additionally, PFC modules with data type identification are allocated from SW 03:

Field Bus Variable	PFC Module	Field Bus Variable	PFC Module
1 byte PFC Input. (Boolean)	0x81,0x80,0x01	2 byte PFC Input (Boolean)	0x81,0x81,0x01
3 byte PFC Input (Boolean)	0x81,0x82,0x01	4 byte PFC Input (Boolean)	0x81,0x83,0x01
5 byte PFC Input (Boolean)	0x81,0x84,0x01	6 byte PFC Input (Boolean)	0x81,0x85,0x01
7 byte PFC Input (Boolean)	0x81,0x86,0x01	8 byte PFC Input (Boolean)	0x81,0x87,0x01
9 byte PFC Input (Boolean)	0x81,0x88,0x01	10 byte PFC Input (Boolean)	0x81,0x89,0x01
11 byte PFC Input (Boolean)	0x81,0x8A,0x01	12 byte PFC Input (Boolean)	0x81,0x8B,0x01
13 byte PFC Input (Boolean)	0x81,0x8C,0x01	14 byte PFC Input (Boolean)	0x81,0x8D,0x01
15 byte PFC Input (Boolean)	0x81,0x8E,0x01	16 byte PFC Input (Boolean)	0x81,0x8F,0x01
1 byte PFC Input (Integer8)	0x81,0x80,0x02	2 byte PFC Input (Integer8)	0x81,0x81,0x02
3 byte PFC Input (Integer8)	0x81,0x82,0x02	4 byte PFC Input (Integer8)	0x81,0x83,0x02
5 byte PFC Input (Integer8)	0x81,0x84,0x02	6 byte PFC Input (Integer8)	0x81,0x85,0x02
7 byte PFC Input (Integer8)	0x81,0x86,0x02	8 byte PFC Input (Integer8)	0x81,0x87,0x02
9 byte PFC Input (Integer8)	0x81,0x88,0x02	10 byte PFC Input (Integer8)	0x81,0x89,0x02
11 byte PFC Input (Integer8)	0x81,0x8A,0x02	12 byte PFC Input (Integer8)	0x81,0x8B,0x02
13 byte PFC Input (Integer8)	0x81,0x8C,0x02	14 byte PFC Input (Integer8)	0x81,0x8D,0x02
15 byte PFC Input (Integer8)	0x81,0x8E,0x02	16 byte PFC Input (Integer8)	0x81,0x8F,0x02
2 byte PFC Input (Integer16)	0x81,0x81,0x03	4 byte PFC Input (Integer16)	0x81,0x83,0x03
6 byte PFC Input (Integer16)	0x81,0x85,0x03	8 byte PFC Input (Integer16)	0x81,0x87,0x03
10 byte PFC Input (Integer16)	0x81,0x89,0x03	12 byte PFC Input (Integer16)	0x81,0x8B,0x03
14 byte PFC Input (Integer16)	0x81,0x8D,0x03	16 byte PFC Input (Integer16)	0x81,0x8F,0x03
4 byte PFC Input (Integer32)	0x81,0x83,0x04	8 byte PFC Input (Integer32)	0x81,0x87,0x04
12 byte PFC Input (Integer32)	0x81,0x8B,0x04	16 byte PFC Input (Integer32)	0x81,0x8F,0x04
20 byte PFC Input (Integer32)	0x81,0x93,0x04	24 byte PFC Input (Integer32)	0x81,0x97,0x04
28 byte PFC Input (Integer32)	0x81,0x9B,0x04	32 byte PFC Input (Integer32)	0x81,0x9F,0x04
1 byte PFC Input (Unsigned8)	0x81,0x80,0x05	2 byte PFC Input (Unsigned8)	0x81,0x81,0x05
3 byte PFC Input (Unsigned8)	0x81,0x82,0x05	4 byte PFC Input (Unsigned8)	0x81,0x83,0x05
5 byte PFC Input (Unsigned8)	0x81,0x84,0x05	6 byte PFC Input (Unsigned8)	0x81,0x85,0x05
7 byte PFC Input (Unsigned8)	0x81,0x86,0x05	8 byte PFC Input (Unsigned8)	0x81,0x87,0x05
9 byte PFC Input (Unsigned8)	0x81,0x88,0x05	10 byte PFC Input (Unsigned8)	0x81,0x89,0x05
11 byte PFC Input (Unsigned8)	0x81,0x8A,0x05	12 byte PFC Input (Unsigned8)	0x81,0x8B,0x05
13 byte PFC Input (Unsigned8)	0x81,0x8C,0x05	14 byte PFC Input (Unsigned8)	0x81,0x8D,0x05
15 byte PFC Input (Unsigned8)	0x81,0x8E,0x05	16 byte PFC Input (Unsigned8)	0x81,0x8F,0x05

Field Bus Variable	PFC Module	Field Bus Variable	PFC Module
2 byte PFC Input (Unsigned16)	0x81,0x81,0x06	4 byte PFC Input (Unsigned16)	0x81,0x83,0x06
6 byte PFC Input (Unsigned16)	0x81,0x85,0x06	8 byte PFC Input (Unsigned16)	0x81,0x87,0x06
10 byte PFC Input (Unsigned16)	0x81,0x89,0x06	12 byte PFC Input (Unsigned16)	0x81,0x8B,0x06
14 byte PFC Input (Unsigned16)	0x81,0x8D,0x06	16 byte PFC Input (Unsigned16)	0x81,0x8F,0x06
4 byte PFC Input (Unsigned32)	0x81,0x83,0x07	8 byte PFC Input (Unsigned32)	0x81,0x87,0x07
12 byte PFC Input (Unsigned32)	0x81,0x8B,0x07	16 byte PFC Input (Unsigned32)	0x81,0x8F,0x07
2 byte PFC Input(Visib. String)	0x81,0x81,0x09	3 byte PFC Input(Visib. String)	0x81,0x82,0x09
4 byte PFC Input(Visib. String)	0x81,0x83,0x09	5 byte PFC Input(Visib. String)	0x81,0x84,0x09
6 byte PFC Input(Visib. String)	0x81,0x85,0x09	7 byte PFC Input(Visib. String)	0x81,0x86,0x09
8 byte PFC Input(Visib. String)	0x81,0x87,0x09	9 byte PFC Input(Visib. String)	0x81,0x88,0x09
10 byte PFC Input(Visib. String)	0x81,0x89,0x09	11 byte PFC Input(Visib. String)	0x81,0x8A,0x09
12 byte PFC Input(Visib. String)	0x81,0x8B,0x09	13 byte PFC Input(Visib. String)	0x81,0x8C,0x09
14 byte PFC Input(Visib. String)	0x81,0x8D,0x09	15 byte PFC Input(Visib. String)	0x81,0x8E,0x09
16 byte PFC Input(Visib. String)	0x81,0x8F,0x09		
2 byte PFC Input (Octet String)	0x81,0x81,0x0A	3 byte PFC Input (Octet String)	0x81,0x82,0x0A
4 byte PFC Input (Octet String)	0x81,0x83,0x0A	5 byte PFC Input (Octet String)	0x81,0x84,0x0A
6 byte PFC Input (Octet String)	0x81,0x85,0x0A	7 byte PFC Input (Octet String)	0x81,0x86,0x0A
8 byte PFC Input (Octet String)	0x81,0x87,0x0A	9 byte PFC Input (Octet String)	0x81,0x88,0x0A
10 byte PFC Input (Octet String)	0x81,0x89,0x0A	11 byte PFC Input (Octet String)	0x81,0x8A,0x0A
12 byte PFC Input (Octet String)	0x81,0x8B,0x0A	13 byte PFC Input (Octet String)	0x81,0x8C,0x0A
14 byte PFC Input (Octet String)	0x81,0x8D,0x0A	15 byte PFC Input (Octet String)	0x81,0x8E,0x0A
16 byte PFC Input (Octet String)	0x81,0x8F,0x0A		

5.3.7.2 PFC Output Variables in the Field Bus Input Process Image

The following PFC modules are allocated up to SW 02:

Field Bus Variable	PFC Module	Field Bus Variable	PFC Module
1 byte PFC Outputs	0x90	2 byte PFC Outputs	0x91
3 byte PFC Outputs	0x92	4 byte PFC Outputs	0x93
5 byte PFC Outputs	0x94	6 byte PFC Outputs	0x95
7 byte PFC Outputs	0x96	8 byte PFC Outputs	0x97
9 byte PFC Outputs	0x98	10 byte PFC Outputs	0x99
11 byte PFC Outputs	0x9A	12 byte PFC Outputs	0x9B
13 byte PFC Outputs	0x9C	14 byte PFC Outputs	0x9D
15 byte PFC Outputs	0x9E	16 byte PFC Outputs	0x9F
17 byte PFC Outputs	0x40,0x90	18 byte PFC Outputs	0x40,0x91
19 byte PFC Outputs	0x40,0x92	20 byte PFC Outputs	0x40,0x93
21 byte PFC Outputs	0x40,0x94	22 byte PFC Outputs	0x40,0x95
23 byte PFC Outputs	0x40,0x96	24 byte PFC Outputs	0x40,0x97
25 byte PFC Outputs	0x40,0x98	26 byte PFC Outputs	0x40,0x99
27 byte PFC Outputs	0x40,0x9A	28 byte PFC Outputs	0x40,0x9B
29 byte PFC Outputs	0x40,0x9C	30 byte PFC Outputs	0x40,0x9D
31 byte PFC Outputs	0x40,0x9E	32 byte PFC Outputs	0x40,0x9F
33 byte PFC Outputs	0x40,0xA0	34 byte PFC Outputs	0x40,0xA1
35 byte PFC Outputs	0x40,0xA2	36 byte PFC Outputs	0x40,0xA3
37 byte PFC Outputs	0x40,0xA4	38 byte PFC Outputs	0x40,0xA5
39 byte PFC Outputs	0x40,0xA6	40 byte PFC Outputs	0x40,0xA7
41 byte PFC Outputs	0x40,0xA8	42 byte PFC Outputs	0x40,0xA9
43 byte PFC Outputs	0x40,0xAA	44 byte PFC Outputs	0x40,0xAB
45 byte PFC Outputs	0x40,0xAC	46 byte PFC Outputs	0x40,0xAD
47 byte PFC Outputs	0x40,0xAE	48 byte PFC Outputs	0x40,0xAF
49 byte PFC Outputs	0x40,0xB0	50 byte PFC Outputs	0x40,0xB1
51 byte PFC Outputs	0x40,0xB2	52 byte PFC Outputs	0x40,0xB3
53 byte PFC Outputs	0x40,0xB4	54 byte PFC Outputs	0x40,0xB5
55 byte PFC Outputs	0x40,0xB6	56 byte PFC Outputs	0x40,0xB7
57 byte PFC Outputs	0x40,0xB8	58 byte PFC Outputs	0x40,0xB9
59 byte PFC Outputs	0x40,0xBA	60 byte PFC Outputs	0x40,0xBB
61 byte PFC Outputs	0x40,0xBC	62 byte PFC Outputs	0x40,0xBD
63 byte PFC Outputs	0x40,0xBE	64 byte PFC Outputs	0x40,0xBF

Additionally PFC modules with data type identification are allocated from SW 03:

Field Bus Variable	PFC Module	Field Bus Variable	PFC Module
1 byte PFC Output (Boolean)	0x41,0x80,0x01	2 byte PFC Output (Boolean)	0x41,0x81,0x01
3 byte PFC Output (Boolean)	0x41,0x82,0x01	4 byte PFC Output (Boolean)	0x41,0x83,0x01
5 byte PFC Output (Boolean)	0x41,0x84,0x01	6 byte PFC Output (Boolean)	0x41,0x85,0x01
7 byte PFC Output (Boolean)	0x41,0x86,0x01	8 byte PFC Output (Boolean)	0x41,0x87,0x01
9 byte PFC Output (Boolean)	0x41,0x88,0x01	10 byte PFC Output (Boolean)	0x41,0x89,0x01
11 byte PFC Output (Boolean)	0x41,0x8A,0x01	12 byte PFC Output (Boolean)	0x41,0x8B,0x01
13 byte PFC Output (Boolean)	0x41,0x8C,0x01	14 byte PFC Output (Boolean)	0x41,0x8D,0x01
15 byte PFC Output (Boolean)	0x41,0x8E,0x01	16 byte PFC Output (Boolean)	0x41,0x8F,0x01
1 byte PFC Output (Integer8)	0x41,0x80,0x02	2 byte PFC Output (Integer8)	0x41,0x81,0x02
3 byte PFC Output (Integer8)	0x41,0x82,0x02	4 byte PFC Output (Integer8)	0x41,0x83,0x02
5 byte PFC Output (Integer8)	0x41,0x84,0x02	6 byte PFC Output (Integer8)	0x41,0x85,0x02
7 byte PFC Output (Integer8)	0x41,0x86,0x02	8 byte PFC Output (Integer8)	0x41,0x87,0x02
9 byte PFC Output (Integer8)	0x41,0x88,0x02	10 byte PFC Output (Integer8)	0x41,0x89,0x02
11 byte PFC Output (Integer8)	0x41,0x8A,0x02	12 byte PFC Output (Integer8)	0x41,0x8B,0x02
13 byte PFC Output (Integer8)	0x41,0x8C,0x02	14 byte PFC Output (Integer8)	0x41,0x8D,0x02
15 byte PFC Output (Integer8)	0x41,0x8E,0x02	16 byte PFC Output (Integer8)	0x41,0x8F,0x02
2 byte PFC Output (Integer16)	0x41,0x81,0x03	4 byte PFC Output (Integer16)	0x41,0x83,0x03
6 byte PFC Output (Integer16)	0x41,0x85,0x03	8 byte PFC Output (Integer16)	0x41,0x87,0x03
10 byte PFC Output (Integer16)	0x41,0x89,0x03	12 byte PFC Output (Integer16)	0x41,0x8B,0x03
14 byte PFC Output (Integer16)	0x41,0x8D,0x03	16 byte PFC Output (Integer16)	0x41,0x8F,0x03
4 byte PFC Output (Integer32)	0x41,0x83,0x04	8 byte PFC Output (Integer32)	0x41,0x87,0x04
12 byte PFC Output (Integer32)	0x41,0x8B,0x04	16 byte PFC Output (Integer32)	0x41,0x8F,0x04
1 byte PFC Output (Unsigned8)	0x41,0x80,0x05	2 byte PFC Output (Unsigned8)	0x41,0x81,0x05
3 byte PFC Output (Unsigned8)	0x41,0x82,0x05	4 byte PFC Output (Unsigned8)	0x41,0x83,0x05
5 byte PFC Output (Unsigned8)	0x41,0x84,0x05	6 byte PFC Output (Unsigned8)	0x41,0x85,0x05
7 byte PFC Output (Unsigned8)	0x41,0x86,0x05	8 byte PFC Output (Unsigned8)	0x41,0x87,0x05
9 byte PFC Output (Unsigned8)	0x41,0x88,0x05	10 byte PFC Output (Unsigned8)	0x41,0x89,0x05
11 byte PFC Output (Unsigned8)	0x41,0x8A,0x05	12 byte PFC Output (Unsigned8)	0x41,0x8B,0x05
13 byte PFC Output (Unsigned8)	0x41,0x8C,0x05	14 byte PFC Output (Unsigned8)	0x41,0x8D,0x05
15 byte PFC Output (Unsigned8)	0x41,0x8E,0x05	16 byte PFC Output (Unsigned8)	0x41,0x8F,0x05

Field Bus Variable	PFC Module	Field Bus Variable	PFC Module
2 byte PFC Output (Unsigned16)	0x41,0x81,0x06	4 byte PFC Output (Unsigned16)	0x41,0x83,0x06
6 byte PFC Output (Unsigned16)	0x41,0x85,0x06	8 byte PFC Output (Unsigned16)	0x41,0x87,0x06
10 byte PFC Output (Unsigned16)	0x41,0x89,0x06	12 byte PFC Output (Unsigned16)	0x41,0x8B,0x06
14 byte PFC Output (Unsigned16)	0x41,0x8D,0x06	16 byte PFC Output (Unsigned16)	0x41,0x8F,0x06
4 byte PFC Output (Unsigned32)	0x41,0x83,0x07	8 byte PFC Output (Unsigned32)	0x41,0x87,0x07
12 byte PFC Output (Unsigned32)	0x41,0x8B,0x07	16 byte PFC Output (Unsigned32)	0x41,0x8F,0x07
1 byte PFC Output(Visib. String)	0x41,0x80,0x09	2 byte PFC Output(Visib. String)	0x41,0x81,0x09
3 byte PFC Output(Visib. String)	0x41,0x82,0x09	4 byte PFC Output(Visib. String)	0x41,0x83,0x09
5 byte PFC Output(Visib. String)	0x41,0x84,0x09	6 byte PFC Output(Visib. String)	0x41,0x85,0x09
7 byte PFC Output(Visib. String)	0x41,0x86,0x09	8 byte PFC Output(Visib. String)	0x41,0x87,0x09
9 byte PFC Output(Visib. String)	0x41,0x88,0x09	10 byte PFC Output(Visib. String)	0x41,0x89,0x09
11 byte PFC Output(Visib. String)	0x41,0x8A,0x09	12 byte PFC Output(Visib. String)	0x41,0x8B,0x09
13 byte PFC Output(Visib. String)	0x41,0x8C,0x09	14 byte PFC Output(Visib. String)	0x41,0x8D,0x09
15 byte PFC Output(Visib. String)	0x41,0x8E,0x09	16 byte PFC Output(Visib. String)	0x41,0x8F,0x09
1 byte PFC Output (Octet String)	0x41,0x80,0x0A	2 byte PFC Output (Octet String)	0x41,0x81,0x0A
3 byte PFC Output (Octet String)	0x41,0x82,0x0A	4 byte PFC Output (Octet String)	0x41,0x83,0x0A
5 byte PFC Output (Octet String)	0x41,0x84,0x0A	6 byte PFC Output (Octet String)	0x41,0x85,0x0A
7 byte PFC Output (Octet String)	0x41,0x86,0x0A	8 byte PFC Output (Octet String)	0x41,0x87,0x0A
9 byte PFC Output (Octet String)	0x41,0x88,0x0A	10 byte PFC Output (Octet String)	0x41,0x89,0x0A
11 byte PFC Output (Octet String)	0x41,0x8A,0x0A	12 byte PFC Output (Octet String)	0x41,0x8B,0x0A
13 byte PFC Output (Octet String)	0x41,0x8C,0x0A	14 byte PFC Output (Octet String)	0x41,0x8D,0x0A
15 byte PFC Output (Octet String)	0x41,0x8E,0x0A	16 byte PFC Output (Octet String)	0x41,0x8F,0x0A

5.4 Configuration and Parameterization of the I/O Modules

Note
For simplification only the item numbers are shown as module designation in the table. The module „750-400“ thus corresponds to the module „750-400 2 DI/24 V DC/3.0 ms“

5.4.1 Digital I/O Modules

All binary I/O modules contain 3 bytes of extended parameterization information, which serve, amongst others, for the identification of the internal bus and the structure of the mapping table. For modules capable of diagnostics, the diagnostics message can be suppressed or released channel for channel or module for module. Binary outputs offer the possibility of switching to a predetermined state in the case of a master failure.

5.4.1.1 2 DI I/O Modules

Module	Identification hex	Identification dec
750-400, 750-401, 750-405, 750-406, 750-410, 750-411, 750-412, 750-413, 750-416, 750-427, 750-435, 750-438, 750-4dd 2 DI	0x10	16
*750-400, *750-401, *750-405, *750-406, *750-410, *750-411, *750-412, *750-413, *750-416, *750-427, *750-435, *750-438, *750-4dd 2 DI	0x00	0

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	2	0
PROFIBUS DP	2	0
PFC (CPU)	2	0

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module - set to zero by the coupler

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
Italic		cannot be changed

5.4.1.2 2 DI I/O Modules with 1 Bit Diagnostics per Channel

Module	Identification hex	Identification dec
750-419, 750-425, 750-4dd 2 DI/DIA Diagnostics in the input process image	0x30	48
750-419, 750-425, 750-4dd 2 DI/DIA	0x10	16
*750-419, *750-425, *750-4dd 2 DI/DIA	0x00	0

Process Image		Input Image in [Bit]	Output Image in [Bit]
Internal bus		4	0
PROFIBUS DP	Diagnostics in the input process image		
	Yes	4	0
	No	2	0
PFC (CPU)		4[1)] (2[2)])	0

Parameter	Value	Meaning
I/O module is physically	plug fitted[*)] not plug fitted	The I/O module process data is - supplied by the I/O module - set to zero by the coupler
Diagnostics is mapped into the Input-PAB (only for *-Modules)	released locked[*)]	The diagnostics information of the I/O module is - mapped into the input process image - not mapped into the input process image
Diagnostics channel x	released locked[*)]	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

[*)] Default settings

Parameter (up to Firmware 06)								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *1*	1 *0*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*

Parameter (from Firmware 07)								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 PA-Diag	3 *0*	2 *0*	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *1*	3 *0*	2 *1*	1 *0*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 Diag En1	1 *0*	0 Diag En0

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$PA\text{-}Diag_4$		Diagnostics is mapped into the Input-PAB
(only for	0	locked
*-Modules)	1	released
$DiagEn1_3$		Diagnostics idle run, short circuit on channel 2
	0	locked
	1	released
$DiagEn0_2$		Diagnostics idle run, short circuit on channel 1
	0	locked
	1	released
Italic		cannot be changed

5.4.1.3 4 DI I/O Modules

Module	Identification hex	Identification dec
750-402, 750-403, 750-408, 750-409, 750-414, 750-415, 750-422, 750-423, 750-424, 750-428, 750-432, 750-433, 750-4dd 4 DI	0x10	16
*750-402, *750-403, *750-408, *750-409, *750-414, *750-415, *750-422, *750-423, *750-424, *750-428, *750-432, *750-433, *750-4dd 4 DI	0x00	0

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	4	0
PROFIBUS DP	4	0
PFC (CPU)	4	0

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module - set to zero by the coupler

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*

PFC_6 0 Module is mapped into the field bus PA and PFC-PA
1 Module is exclusively mapped into the PFC-PA

$Plug_5$ 0 Module is physically not present
1 Module is physically present (default)

Italic cannot be changed

5.4.1.4 8 DI I/O Modules

Module	Identification hex	Identification dec
750-430, 750-431, 750-436, 750-437, 750-4dd 8 DI	0x10	16

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	8	0
PROFIBUS DP	8	0
PFC (CPU)	8	0

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module - set to zero by the coupler

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *1*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
Italic		cannot be changed

5.4.1.5 16 DI I/O Modules

Module	Identification hex	Identification dec
750-4dd 16 DI	0x11	17

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	16	0
PROFIBUS DP	16	0

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module - set to zero by the coupler

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *1*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
Italic		cannot be changed

5.4.1.6 2 DO I/O Modules

Module	Identification hex	Identification dec
750-501, 750-502, 750-509, 750-512, 750-513, 750-514, 750-517, 750-535, 750-5dd 2 DO, Buerkert 8644 monost. 2 DO	0x20	32
*750-501, *750-502, *750-509, *750-512, *750-513, *750-514, *750-517, *750-535, *750-5dd 2 DO, *Buerkert 8644 monost. 2 DO	0x00	0

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	0	2
PROFIBUS DP	0	2
PFC (CPU)	0	2

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module - set to zero by the coupler
Substitute channel x	0*) 1	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *0*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 SV1	0 SV0

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$SV0_0$		Substitute channel 1
$SV0_1$		Substitute channel 2
Italic		cannot be changed

5.4.1.7 2 (1) DO I/O Modules with 1 Bit Diagnostics per Channel

Module	Identification hex	Identification dec
750-507, 750-522, 750-523 (1 DO), 750-5dd 2 DO/2 DIA-DI/2 DIA, Diagnostics in the input process image	0x30	48
750-507, 750-522, 750-523 (1 DO), 750-5dd 2 DO/2 DIA	0x20	32
*750-507, *750-522, 750-523 (1 DO), *750-5dd 2 DO/2 DIA	0x00	0

Process Image		Input Image in [Bit]	Output Image in [Bit]
Internal bus		2	2
PROFIBUS DP	Diagnostics in the input process image		
	Yes	2 (1)	2 (1)
	No	0	2 (1)
PFC (CPU)		2[1)] (0[2)])	2 (1)

Parameter	Value	Meaning
I/O module is physically	plug fitted[*)] not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Diagnostics is mapped into the Input-PAB (only for *-Modules)	released locked[*)]	The diagnostics information of the I/O module is - mapped into the input process image - not mapped into the input process image
Diagnostics channel x	released locked[*)]	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master
Substitute channel x	0[*)] 1	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

[*)] Default settings

Parameter (up to Firmware 06)								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 SV1	0 SV0

Parameter (from Firmware 07)								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 PA-Diag	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *1*	3 *0*	2 *0*	1 *1*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 SV1	2 Diag En1	1 SV0	0 Diag En0

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$PA\text{-}Diag_4$		Diagnostics is mapped into the Input-PAB
(only for	0	locked
*-Modules)	1	released
$DiagEn0_2$		Diagnostics error (idle run, overload or short circuit) on channel 1
	0	locked
	1	released
$DiagEn1_3$		Diagnostics error (idle run, overload or short circuit) on channel 2
	0	locked
	1	released
$SV0_0$		Substitute channel 1
$SV0_1$		Substitute channel 2
Italic		cannot be changed

5.4.1.8 2 DO I/O Module with 2 Bit Diagnostics per Channel

Module	Identification hex	Identification dec
750-506, 750-5dd 2 DO/4DIA-DI/4 DIA, Diagnostics in the input process image	0x30	48
750-506, 750-5dd 2 DO/4 DIA	0x20	32
*750-506, *750-5dd 2 DO/4 DIA	0x00	0

Process Image		Input Image in [Bit]	Output Image in [Bit]
Internal bus		4	4
PROFIBUS DP	Diagnostics in the input process image		
	Yes	4	2
	No	0	2
PFC (CPU)		4[1] (0[2])	4[1] (2[2])

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Diagnostics is mapped into the Input-PAB (only for *-Modules)	released locked*)	The diagnostics information of the I/O module is - mapped into the input process image - not mapped into the input process image
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master
Substitute channel x	0*) 1	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

*) Default settings

Parameter (up to Firmware 06)								
Offset	Information							
0	7 *0*	6 *0*	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 SV1	0 SV0

Parameter (from Firmware 07)								
Offset	Information							
0	7 *0*	6 *0*	5 Plug	4 PA-Diag	3 *0*	2 *0*	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *1*	3 *0*	2 *0*	1 *1*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 SV1	2 Diag En1	1 SV0	0 Diag En0

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$PA\text{-}Diag_4$		Diagnostics is mapped into the Input-PAB
(only for	0	locked
*-Modules)	1	released
$DiagEn0_2$		Diagnostics short circuit, undervoltage, broken wire, error on channel 1
	0	locked
	1	released
$DiagEn1_3$		Diagnostics short circuit, undervoltage, broken wire, error on channel 2
	0	locked
	1	released
$SV0_0$		Substitute channel 1
$SV0_1$		Substitute channel 2
Italic		cannot be changed

5.4.1.9 4 DO I/O Modules

Module	Identification hex	Identification dec
750-504, 750-516, 750-519, 750-5dd 4 DO, Buerkert 8644 monost. 3 DO, Buerkert 8644 monost. 4 DO, Buerkert 8644 bistab. 4 DO	0x20	32
*750-504, *750-516, *750-519, *750-5dd 4 DO, *Buerkert 8644 monost. 3 DO, *Buerkert 8644 monost. 4 DO, *Buerkert 8644 bistab. 4 DO	0x00	0

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	0	4
PROFIBUS DP	0	4
PFC (CPU)	0	4

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Substitute channel x	0*) 1	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *0*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 SV3	2 SV2	1 SV1	0 SV0

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$SV0_0$		Substitute channel 1
$SV0_1$		Substitute channel 2
$SV0_2$		Substitute channel 3
$SV0_3$		Substitute channel 4
Italic		cannot be changed

5.4.1.10 4 DO I/O Modules with 1 Bit Diagnostics per Channel

Module	Identification hex	Identification dec
750-532, 750-5dd 4 DO/4 DIA-DI/DIA, Diagnostics in the input process image	0x30	48
750-532, 750-5dd 4 DO/4 DIA	0x20	32
*750-532, *750-5dd 4 DO/4 DIA	0x00	0

Process Image		Input Image in [Bit]	Output Image in [Bit]
Internal bus		4	4
PROFIBUS DP	Diagnostics in the input process image		
	Yes	4	4
	No	0	4
PFC (CPU)		4[1)] (0[2)])	4

Parameter	Value	Meaning
I/O module is physically	plug fitted[*)] not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Diagnostics is mapped into the Input-PAB (only for *-Modules)	released locked[*)]	The diagnostics information of the I/O module is - mapped into the input process image - not mapped into the input process image
Diagnostics channel x	released locked[*)]	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master
Substitute channel x	0[*)] 1	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

[*)] Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 PA-Diag	3 *0*	2 *0*	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *1*	3 *1*	2 *0*	1 *1*	0 *1*
2	7 SV3	6 Diag En3	5 SV2	4 Diag En2	3 SV1	2 Diag En1	1 SV0	0 Diag En0

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$PA\text{-}Diag_4$		Diagnostics is mapped into the Input-PAB
(only for *-Modules)	0	locked
	1	released
$DiagEn0_4$		Diagnostics error on channel 1
	0	locked
	1	released
$DiagEn1_5$		Diagnostics error on channel 2
	0	locked
	1	released
$DiagEn2_6$		Diagnostics error on channel 3
	0	locked
	1	released
$DiagEn3_7$		Diagnostics error on channel 4
	0	locked
	1	released
$SV0_0$		Substitute channel 1
$SV1_1$		Substitute channel 2
$SV2_2$		Substitute channel 3
$SV3_3$		Substitute channel 4
Italic		cannot be changed

5.4.1.11 8 DO I/O Modules

Module	Identification hex	Identification dec
750-530, 750-536, 750-5dd 8 DO, Buerkert 8644 monost. 8 DO V2	0x20	32
Buerkert 8644 monost. 8 DO V1	0x20, 0x00, 0x00, 0x00	32, 0, 0, 0

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	0	8
PROFIBUS DP	0	8
PFC (CPU)	0	8

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Substitute channel x	0*) 1	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

*) Default settings

Parameter (750-530, 750-536, 750-5dd 8 DO , Buerkert 8644 monost. 8 DO V2)								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *1*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *0*
2	7 SV7	6 SV6	5 SV5	4 SV4	3 SV3	2 SV2	1 SV1	0 SV0

Parameter (Buerkert 8644 monost. 8 DO V1)								
Offset	Information							
0	7 *0*	6 *0*	5 *1*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *0*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 SV1	0 SV0
0	7 *0*	6 *0*	5 *1*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *0*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 SV3	0 SV2
0	7 *0*	6 *0*	5 *1*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *0*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 SV5	0 SV4
0	7 *0*	6 *0*	5 *1*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *1*	0 *0*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 SV7	0 SV6

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$SV0_0$		Substitute channel 1
$SV1_1$		Substitute channel 2
$SV2_2$		Substitute channel 3
$SV3_3$		Substitute channel 4
$SV4_4$		Substitute channel 5
$SV5_5$		Substitute channel 6
$SV6_6$		Substitute channel 7
$SV7_7$		Substitute channel 8
Italic		cannot be changed

5.4.1.12 8 DO I/O Modules with 1 Bit Diagnostics per Channel

Module	Identification hex	Identification dec
750-537, 750-5dd 8 DO/8 DIA-DI/8 DIA, Diagnostics in the input process image	0x30	48
750-537, 750-5dd 8 DO/8 DIA	0x20	32

Process Image		Input Image in [Bit]	Output Image in [Bit]
Internal bus		8	8
PROFIBUS DP	Diagnostics in the input process image		
	Yes	8	8
	No	0	8
PFC (CPU)		8[1)] (0[2)])	8

Parameter	Value	Meaning
I/O module is physically	Plug fitted[*)] not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Diagnostics channel x	released locked[*)]	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master
Substitute channel x	0[*)] 1	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

[*)] Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *PA-Diag*	3 *0*	2 *0*	1 *1*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *1*	3 *1*	2 *0*	1 *1*	0 *1*
2	7 SV3	6 Diag En3	5 SV2	4 Diag En2	3 SV1	2 Diag En1	1 SV0	0 Diag En0
3	7 SV7	6 Diag En7	5 SV6	4 Diag En6	3 SV5	2 Diag En5	1 SV4	0 Diag En4

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$PA\text{-}Diag_4$		Diagnostics is mapped into the Input-PAB
	0	locked
	1	released
$DiagEn0_0$		Diagnostics error on channel 1
	0	locked
	1	released
$DiagEn1_1$		Diagnostics error on channel 2
	0	locked
	1	released
$DiagEn2_2$		Diagnostics error on channel 3
	0	locked
	1	released
$DiagEn3_3$		Diagnostics error on channel 4
	0	locked
	1	released
$DiagEn4_4$		Diagnostics error on channel 5
	0	locked
	1	released
$DiagEn5_5$		Diagnostics error on channel 6
	0	locked
	1	released
$DiagEn6_6$		Diagnostics error on channel 7
	0	locked
	1	released
$DiagEn7_7$		Diagnostics error on channel 8
	0	locked
	1	released
$SV0_0$		Substitute channel 1
$SV1_1$		Substitute channel 2
$SV2_2$		Substitute channel 3
$SV3_3$		Substitute channel 4
$SV4_4$		Substitute channel 5
$SV5_5$		Substitute channel 6
$SV6_6$		Substitute channel 7
$SV7_7$		Substitute channel 8
Italic		cannot be changed

5.4.1.13 16 DO I/O Module

Module	Identification hex	Identification dec
750-5dd 16 DO, Buerkert 8644 monost. 16 DO	0x21	33

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	0	16
PROFIBUS DP	0	16
PFC (CPU)	0	16

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Substitute channel x	0*) 1	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *1*	0 *0*
1	7 *0*	6 *0*	5 *0*	4 *1*	3 *0*	2 *0*	1 *1*	0 *0*
2	7 SV7	6 SV6	5 SV5	4 SV4	3 SV3	2 SV2	1 SV1	0 SV0
2	7 SV15	6 SV14	5 SV13	4 SV12	3 SV11	2 SV10	1 SV9	0 SV8

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$SV0_0$		Substitute channel 1
$SV1_1$		Substitute channel 2
$SV2_2$		Substitute channel 3
$SV3_3$		Substitute channel 4
$SV4_4$		Substitute channel 5
$SV5_5$		Substitute channel 6
$SV6_6$		Substitute channel 7
$SV7_7$		Substitute channel 8
$SV8_0$		Substitute channel 9
$SV9_1$		Substitute channel 10
$SV10_2$		Substitute channel 11
$SV11_3$		Substitute channel 12
$SV12_4$		Substitute channel 13
$SV13_5$		Substitute channel 14
$SV14_6$		Substitute channel 15
$SV15_7$		Substitute channel 16
Italic		cannot be changed

5.4.1.14 2 DI/DO I/O Modules with 1 Bit Diagnostics per Channel

Module	Identification hex	Identification dec
750-418	0x30	48
*750-418	0x00	0

Process Image		Input Image in [Bit]	Output Image in [Bit]
Internal bus		4	4
PROFIBUS DP	Diagnostics in the input process image		
	Yes	4	2
	No	2	2
PFC (CPU)		4[1] (2[2])	4[1] (2[2])

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Diagnostics is mapped into the Input-PAB (only for *-Modules)	released locked*)	The diagnostics information of the I/O module is - mapped into the input process image - not mapped into the input process image
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter (up to Firmware 06)								
Offset	Information							
0	7 *0*	6 *0*	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *1*	1 *1*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*

Parameter (from Firmware 07)								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 PA-Diag	3 *0*	2 Diag En0 *0*	1 *0*	0 *1*
1	7 *0*	6 *0*	5 *0*	4 *1*	3 *0*	2 *1*	1 *1*	0 *1*
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 Diag En1	1 *0*	0 Diag En0

PFC_6	0	Module is mapped into the field bus PA and PFC-PA
	1	Module is exclusively mapped into the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$PA\text{-}Diag_4$		Diagnostics is mapped into the Input-PAB
	0	locked
	1	released
$DiagEn0_2$		Diagnostics idle run, short circuit on channel 1
	0	locked
	1	released
$DiagEn1_3$		Diagnostics idle run, short circuit on channel 2
	0	locked
	1	released
Italic		cannot be changed

5.4.1.15 Power Supply Modules with Diagnostics

Module	Diagnostics Evaluation	Identification hex	Identification dec
750-610, 750-611	via PROFIBUS DP diagnostics telegram	0x00	0
	via PROFIBUS DP process image	0x10 0x00	16 0

Process Image	Input Image in [Bit]	Output Image in [Bit]
Internal bus	2	0
PROFIBUS DP	0 (2)	0
PFC (CPU)	2	0

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is: - supplied by the I/O module - set to zero by the coupler
Diagnostics field voltage breakdown Diagnostics fuse breakage	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter (up to Firmware 06)									
Offset	Information								
0	7 *0*	6 *0*	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 *0*	0 *0*	*Evaluation of the diagnostics via PROFIBUS-DP-Diagnostics*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*	
0	7 *0*	6 *0*	5 Plug	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*	*Evaluation of the diagnostics via PROFIBUS-DP-Process image*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*	
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*	

$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics field voltage breakdown locked
	1	Diagnostics field voltage breakdown released
$DiagEn1_3$	0	Diagnostics fuse breakage locked
	1	Diagnostics fuse breakage released
Italic		cannot be changed

Parameter (from Firmware 07)									
Offset	Information								
0	7 *0*	6 *0*	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*	*Evaluation of the diagnostics via PROFIBUS-DP-Diagnostics*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*	
0	7 *0*	6 *0*	5 Plug	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*	*Evaluation of the diagnostics via PROFIBUS-DP-Process image*
1	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *1*	
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*	

$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics field voltage breakdown, fuse breakage locked
	1	Diagnostics field voltage breakdown, fuse breakage released
Italic		cannot be changed

5.4.2 Analog I/O Modules

All analog I/O modules have 2 bytes of extendable parameterization information, which serves for the identification on the internal bus and the structure of the mapping table. With analog inputs 2 bytes follow which are reserved for future options. Modules with diagnostics capability allow the diagnostics message to be suppressed or released channel for channel. Analog outputs contain 2 bytes of parameterization data per channel. In this case the substitute values are saved for the respective channels.

5.4.2.1 2 AI I/O Modules

Module	Register Communication possible	Identification hex	Identification dec
750-452, 750-454, 750-456, 750-461, 750-462, 750-465, 750-466, 750-467, 750-469, 750-472, 750-474, 750-475, 750-476, 750-477, 750-478, 750-479, 750-480, 750-483, 750-485, 750-491, 750-492, 750-4aa 2 AI	Yes	0xF2	242
	No	0x51	81

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication		
	Yes	6	6
	No	4	0
PFC (CPU)		4	0

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is: - supplied by the I/O module - set to zero by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter									
Offset	Information								
0	7 *0*	6 PFC	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 *0*	0 *0*
1	7 *0*	6 *1*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0
2	15 *reserved*	14	13	12	11	10	9	8
3	7 *reserved*	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics channel 1 locked
	1	Diagnostics channel 1 released
$DiagEn1_3$	0	Diagnostics channel 2 locked
	1	Diagnostics channel 2 released
ID5 .. ID0		Order number less 450 (e. g. 750-461 would be coded as (461-450) = 11)
Italic		Cannot be changed

5.4.2.2 4 AI I/O Modules

Modules	Register Communication possible	Identification hex	Identification dec
750-453, 750-455, 750-457, 750-459, 750-460, 750-463, 750-468, 750-4aa 4 AI	Yes	0xF5	245
	No	0x53	83

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		12	12
PROFIBUS DP	Register communication possible		
	Yes	12	12
	No	8	0
PFC (CPU)		8	0

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is: - supplied by the I/O module - set to zero by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 Diag En3	0 Diag En2
1	7 *0*	6 *1*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0
2	15 *reserved*	14	13	12	11	10	9	8
3	7 *reserved*	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_0$	0	Diagnostics channel 3 locked
	1	Diagnostics channel 3 released
$DiagEn1_1$	0	Diagnostics channel 4 locked
	1	Diagnostics channel 4 released
$DiagEn0_2$	0	Diagnostics channel 1 locked
	1	Diagnostics channel 1 released
$DiagEn1_3$	0	Diagnostics channel 2 locked
	1	Diagnostics channel 2 released
ID5 .. ID0		Order number less 450 (e. g. 750-461 would be coded as (468-450) = 18)
Italic		Cannot be changed

5.4.2.3 2 AO I/O Modules

Module	Register Communication possible	Identification hex	Identification dec
750-550, 750-552, 750-554, 750-556, 750-560, 750-585, 750-5aa 2 AO	Yes	0xF2	242
	Nein	0x61	97

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	6	6
	No	0	4
PFC (CPU)		0	4

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master
Substitute channel x	0x0000 or 0x8000 0 or -32767 ... 0x7FFF ... 32767	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *0*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0
2	15	14	13	12	11	9	8	7 SubVal_Ch1_HB
3	7	6	5	4	3	2	1	0 SubVal_Ch1_LB
4	15	14	13	12	11	10	9	8 SubVal_Ch2_HB
5	7	6	5	4	3	2	1	0 SubVal_Ch2_LB

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics channel 1 locked
	1	Diagnostics channel 1 released
$DiagEn1_3$	0	Diagnostics channel 2 locked
	1	Diagnostics channel 2 released
SubVal_Ch1	0x0000 : 0x7FFF or 0xFFFF	Substitute channel 1
SubVal_Ch2	0x0000 : 0x7FFF or 0xFFFF	Substitute channel 2
ID5 .. ID0		Order number less 550 (e. g. 750-550 would be coded as (550-550) = 0)
Italic		Cannot be changed

5.4.2.4 4 AO I/O Modules

Module	Register Communication possible	Identification hex	Identification dec
750-551, 750-553, 750-557, 750-559, 750-5aa 4 AO	Yes	0xF5	245
	No	0x63	99

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		12	12
PROFIBUS DP	Register communication possible		
	Yes	12	12
	No	0	8
PFC (CPU)		0	8

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied to the I/O module - ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master
Substitute channel x	0x0000 or 0x8000 0 or -32767 ... 0x7FFF ... 32767	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault.

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 Diag En1	2 Diag En0	1 Diag En3	0 Diag En2
1	7 *1*	6 *0*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0
2	15	14	13	12	11	9	8	7
	SubVal_Ch1_HB							
3	7	6	5	4	3	2	1	0
	SubVal_Ch1_LB							
4	15	14	13	12	11	10	9	8
	SubVal_Ch2_HB							
5	7	6	5	4	3	2	1	0
	SubVal_Ch2_LB							
6	15	14	13	12	11	9	8	7
	SubVal_Ch3_HB							
7	7	6	5	4	3	2	1	0
	SubVal_Ch3_LB							
8	15	14	13	12	11	10	9	8
	SubVal_Ch4_HB							
9	7	6	5	4	3	2	1	0
	SubVal_Ch4_LB							

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_0$	0	Diagnostics channel 3 locked
	1	Diagnostics channel 3 released
$DiagEn1_1$	0	Diagnostics channel 4 locked
	1	Diagnostics channel 4released
$DiagEn0_2$	0	Diagnostics channel 1 locked
	1	Diagnostics channel 1 released
$DiagEn1_3$	0	Diagnostics channel 2locked
	1	Diagnostics channel 2released
SubVal_Ch1	0x0000 : 0x7FFF or 0xFFFF	Substitute channel 1
SubVal_Ch2	0x0000 : 0x7FFF or 0xFFFF	Substitute channel 2
SubVal_Ch3	0x0000 : 0x7FFF or 0xFFFF	Substitute channel 1
SubVal_Ch4	0x0000 : 0x7FFF or 0xFFFF	Substitute channel 2
ID5 .. ID0		Order number less 550 (e. g. 750-557 would be coded as (557-550) = 7)
Italic		Cannot be changed

5.4.3 Digital Special Modules

All special digital modules have 2 bytes of extended parameterization information, which serves for the identification on internal bus and the structure of the mapping table.

Input modules (counter) are followed by 2 bytes, which are reserved for future options.

Output modules (PWM outputs) are followed by 6 bytes of parameterization data, which serve for the saving of substitute values for a maximum of 2 channels (2 words).

5.4.3.1 Counter Modules

Module	Identification hex	Identification dec
750-404, 750-638	0xF2	242

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	6	6
	No (not possible)	-	-
PFC (CPU)		6	6

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is: - supplied by the I/O module - set to zero by the coupler

*) Default settings

Parameter									
Offset	Information								
0	7	6	5	4	3	2	1	0	
	0	PFC	Plug	*0*	*0*	*0*	*0*	*0*	
1	7	6	5	4	3	2	1	0	
	0	*1*	*1*	*1*	*0*	*1*	*1*	*0*	ID 750-404
	1	*1*	*0*	*0*	*1*	*0*	*0*	*0*	ID 750-638
2	15	14	13	12	11	9	8	7	
	reserved								
3	7	6	5	4	3	2	1	0	
	reserved								

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
Italic		Cannot be changed

5.4.3.2 PWM Module

Module	Identification hex	Identification dec
750-511	0xF2	242

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	6	6
	No (not possible)	-	-
PFC (CPU)		6	6

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Substitute channel x	0x0000 *) ... 0x7FFF	If, in the case of a PROFIBUS DP fault, the switching of substitute values is enabled by the coupler parameterization, this data is transmitted to the periphery in the case of a fault..

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
1	7 *1*	6 *0*	5 *1*	4 *1*	3 *1*	2 *1*	1 *0*	0 *1*
2	15 *reserved*	14	13	12	11	9	8	7
3	7 *reserved*	6	5	4	3	2	1	0
4	15 SubVal_Ch1_HB	14	13	12	11	9	8	7
5	7 SubVal_Ch1_LB	6	5	4	3	2	1	0
6	15 SubVal_Ch2_HB	14	13	12	11	10	9	8
7	7 SubVal_Ch2_LB	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
SubVal_Ch1	0x0000 : 0x7FFF	Substitute channel 1
SubVal_Ch2	0x0000 : 0x7FFF	Substitute channel 2
Italic		Cannot be changed

5.4.3.3 Stepper Controller

Module	Identification hex	Identification dec
750-639	0xF1	241

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		3	3
PROFIBUS DP	Register communication possible		
	Yes	4	4
	No (not possible)	-	-
PFC (CPU)		4	4

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 *0*	4 *0*	3 *1*	2 *0*	1 *0*	0 *1*
2	15 *reserved*	14	13	12	11	9	8	7
3	7 *reserved*	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics channel 1 locked
	1	Diagnostics channel 1 released
Italic		Cannot be changed

5.4.4 Distance and Angle Measurement Modules

All interface modules for path and angle measurement have 2 bytes of extended parameterization information, which serves for the identification on internal bus and the structure of the mapping table. Two further bytes follow which are reserved for future options.

5.4.4.1 SSI Encoder Interface

Module	Register Communication possible	Identification hex	Identification dec
750-630	Yes	0xF2	242
	No	0x93	147

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	6	6
	No	4	-
PFC (CPU)		4	0

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*
2	15 *reserved*	14	13	12	11	9	8	7
3	7 *reserved*	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics locked (default)
	1	Diagnostics released
Italic		Cannot be changed

5.4.4.2 Incremental Encoder Interface

Module	Register Communication possible	Identification hex	Identification dec
750-631, 750-634, 750-637	Yes	0xB5	181
	No (not possible)	-	-

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	6	6
	No (not possible)	-	-
PFC (CPU)		6	6

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0
2	15	14	13	12	11	10	9	8
	reserved							
3	7	6	5	4	3	2	1	0
	reserved							

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics locked (default)
	1	Diagnostics released
ID5 .. ID0		Order number less 630 (e. g. 750-634 would be coded as (634-630) = 4)
Italic		Cannot be changed

5.4.4.3 Digital Impulse Interface

Module	Register Communication possible	Identification hex	Identification dec
750-635	Yes	0xB3	179
	No (not possible)	-	-

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	4	4
	No (not possible)	-	-
PFC (CPU)		4	4

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics channel x	released Locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 *0*	4 *0*	3 *0*	2 *1*	1 *0*	0 *1*
2	15 *reserved*	14	13	12	11	10	9	8
3	7 *reserved*	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics locked (default)
	1	Diagnostics released
Italic		Cannot be changed

5.4.5 Serial Interfaces

All serial interface modules have 2 bytes of extended parameter information, which serves for the identification on the internal bus and the structure of the mapping table. Two further bytes follow which are reserved for future options.

Module	Register Communication possible	Identification hex	Identification dec
750-650, 750-651, 750-653, 750-654 (3 Byte Data)	Yes	0xB3	179
	No (not possible)	-	-
750-650, 750-651, 750-653, 750-654 (5 Byte Data)	Yes	0xB5	181
	No (not possible)	-	-

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	4 (6)	4 (6)
	No (not possible)	-	-
PFC (CPU)		4 (6)	4 (6)

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0
2	15	14	13	12	11	10	9	8
	reserved							
3	7	6	5	4	3	2	1	0
	reserved							

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
DiagEn0	0	Diagnostics locked (default)
	1	Diagnostics released
ID5 .. ID0		Order number less 630 (e. g. 750-650 would be coded as (650-630) = 20)
Italic		Cannot be changed

5.4.6 Data Exchange Module

The Data Exchange Module has 2 bytes of extended parameterization information, which serves for the identification on the internal bus and the structure of the mapping table. Two further bytes follow which are reserved for future options.

Module	Register Communication possible	Identification hex	Identification dec
750-654	Yes	0xF2	242
	No	0xF1	241

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	6	6
	No	4	4
PFC (CPU)		4	4

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 *0*	4 *1*	3 *1*	2 *0*	1 *0*	0 *0*
2	15 *reserved*	14	13	12	11	10	9	8
3	7 *reserved*	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
DiagEn0	0	Diagnostics locked (default)
	1	Diagnostics released
Italic		Cannot be changed

5.4.7 ENOCEAN Receiver Module

Module	Register Communication possible	Identification hex	Identification dec
750-642	Yes	0xB3	179
	No (not possible)	-	-

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	4	4
	No (not possible)	-	-
PFC (CPU)		4	4

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 *0*	4 *0*	3 *1*	2 *1*	1 *0*	0 *0*
2	15 *reserved*	14	13	12	11	10	9	8
3	7 *reserved*	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics locked (default)
	1	Diagnostics released
Italic		Cannot be changed

5.4.8 DALI/DSI Master

Module	Register Communication possible	Identification hex	Identification dec
750-641	Yes	0xB5	181
	No (not possible)	-	-

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		6	6
PROFIBUS DP	Register communication possible		
	Yes	6	6
	No (not possible)	-	-
PFC (CPU)		6	6

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0
2	15 *reserved*	14	13	12	11	10	9	8
3	7 *reserved*	6	5	4	3	2	1	0

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics locked (default)
	1	Diagnostics released
ID5 .. ID0		Order number less 630 (e. g. 750-650 would be coded as (650-630) = 20)
Italic		Cannot be changed

5.4.9 AS Interface Master

Module	Register Communication possible	Identification hex	Identification dec
750-655 (12 Byte)	Yes	0xC2, 0x8B, 0x8B, 0x0A, 0x0A	194, 139, 139, 10, 10
750-655 (20 Byte)		0xC2, 0x93, 0x93, 0x0A,0x0A	194, 147, 147, 10, 10
750-655 (24 Byte)		0xC2, 0x97, 0x97, 0x0A, 0x0A	194, 151, 151, 10, 10
750-655 (32 Byte)		0xC2, 0x9F, 0x9F, 0x0A, 0x0A	194, 159, 159, 10, 10
750-655 (40 Byte)		0xC2, 0xA7, 0xA7, 0x0A, 0x0A	194, 167, 167, 10, 10
750-655 (48 Byte)		0xC2, 0xAF, 0xAF, 0x0A, 0x0A	194, 175, 175, 10, 10
750-655 (n Byte)	No (not possible)	-	-

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		12, 20, 24, 32, 40, 48	12, 20, 24, 32, 40, 48
PROFIBUS DP	Register communication possible		
	Yes	12, 20, 24, 32, 40, 48	12, 20, 24, 32, 40, 48
	No (not possible)	-	-
PFC (CPU)		12, 20, 24, 32, 40, 48	12, 20, 24, 32, 40, 48

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Mailbox length	no acyclic channel 6 Byte*) 10 Byte 12 Byte 18 Byte	The length of the acyclic channel (mailbox) is 0 Byte 6 Byte 10 Byte 12 Byte (from 20 Byte data length) 18 Byte (from 20 Byte data length)
Cross-fading mailbox	locked*) released	The process data is by the acyclic channel (mailbox) - not superposed - superposed
Diagnostics channel x	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter								
Offset	Information							
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*
1	7 *1*	6 *1*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0
2	7	6	5	4	3	2	1	0
	Process image length in Byte							
3	7 OVL	6	5	4	3	2	1	0
	Acyclic channel length in Byte							
4	15 *0*	14 *0*	13 *0*	12 *0*	11 *0*	10 *0*	9 *0*	8 *1*
5	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics locked (default)
	1	Diagnostics released
ID5 .. ID0		Order number less 630 (e. g. 750-650 would be coded as (650-630) = 20)
OVL_7	0	The acyclic channel cannot interfere with the process data
	1	The acyclic channel can interfere with the process data
Acyclic channel length	0	No acyclic channel
	6	6 Byte acyclic channel
	10	10 Byte acyclic channel
	12	12 Byte acyclic channel (from 20 Byte data length)
	18	18 Byte acyclic channel (from 20 Byte data length)
Italic		Cannot be changed

5.4.10 *PROFIsafe* Modules

Module	Register Communication possible	Identification hex	Identification dec
750-660, 750-665, 750-666	No	0xC4, 0x84, 0x84, 0x05, 0x0A, 0x05, 0x0A	196, 132, 132, 5, 10, 5, 10
	Yes (not possible)	-	-

Process Image		Input Image in [Byte]	Output Image in [Byte]
Internal bus		8	8
PROFIBUS DP	Register communication possible		
	Yes (not possible)	-	-
	No	5	5
PFC (CPU)		8	8

Parameter	Value	Meaning
I/O module is physically	plug fitted*) not plug fitted	The I/O module process data is - supplied by the I/O module or supplied to the I/O module - set to zero by the coupler or ignored by the coupler
Diagnostics	released locked*)	The diagnostics information of the corresponding channel is - transmitted to PROFIBUS DP master - not transmitted to PROFIBUS DP master

*) Default settings

Parameter									
Offset	Information								
0	7 *0*	6 PFC	5 Plug	4 *0*	3 *0*	2 Diag En0	1 *0*	0 *0*	
1	7 *1*	6 *1*	5 ID5	4 ID4	3 ID3	2 ID2	1 ID1	0 ID0	
2	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*	
3	7 *0*	6 *0*	5 *0*	4 *0*	3 *1*	2 *1*	1 *1*	0 *0*	Block length in Byte
4	15 *0*	14 *0*	13 *0*	12 *0*	11 *0*	10 *1*	9 *0*	8 *1*	Block module ***PROFIsafe***
5	7	6	5	4	3	2	1	0	***PROFIsafe*** module slot
	F_Slot								
6	7 *0*	6 *0*	5 *0*	4 *0*	3 *0*	2 *0*	1 *0*	0 *0*	Specifier
7	7 *0*	6 *0*	5 *F_CRC_Len*	4	3 F_SIL	2	1 *F_Chk iPar*	0 F_Chk SeqNo	F_Prm_Flag1
8	7 *F_Par_Ver*	6	5 *F_Block_ID*	4	3	2 *0*	1 *0*	0 *0*	F_Prm_Flag2
9	15	14	13	12	11	10	9	8	F_Source_Address (1...65534)
	F_Src_Addr_High								
10	7	6	5	4	3	2	1	0	
	F_Src_Addr_Low								
11	7	6	5	4	3	2	1	0	F_Destination_Address (1...65534)
	F_Dst_Addr_High								
12	7	6	5	4	3	2	1	0	
	F_Dst_Addr_Low								
13	15	14	13	12	11	10	9	8	F_Watchdog_Time in ms (1…65535)
	F_WD_Time_High								
14	7	6	5	4	3	2	1	0	
	F_WD_Time_Low								
15	7	6	5	4	3	2	1	0	F_Parameter_CRC (CRC1)
	F_CRC_High								
16	7	6	5	4	3	2	1	0	
	F_CRC_Low								

PFC_6	0	Module is mapped in the field bus and PFC-PA
	1	Module is exclusively mapped in the PFC-PA
$Plug_5$	0	Module is physically not present
	1	Module is physically present (default)
$DiagEn0_2$	0	Diagnostics locked (default)
	1	Diagnostics released
ID5 .. ID0		Order number less 630 (e. g. 750-650 would be coded as (650-630) = 20)
F_Slot	2..63	***PROFIsafe*** module slot
F_ChkSeqNo	0	The consecutive number is not considered in the CRC2 calculation
	1	The consecutive number is considered in the CRC2 calculation
F_Chk_iPar	0	no i-Parameter
F_SIL	0..3	SIL class
	0	SIL1
	1	SIL2
	2	SIL3
	3	none
F_CRC_Len	1	2 Byte CRC because of a user data length of less than 12 Byte
F_Block_ID	0	F-Host/F-Slave-Communication-Connection
$F\_Par\_Ver_{7..6}$	0	Valid for ***PROFIsafe***-Profil versions 1.00 – 1.99
F_Src_Addr	1..65534	***PROFIsafe***-Address of the F-Host
F_Dst_Addr	1..65534	***PROFIsafe***-Address of the F-Slave
F_WD_Time	150..10000	***PROFIsafe***-Watchdogtime in ms
F_CRC	any	***PROFIsafe***-CRC
Italic		Cannot be changed

5.5 Acyclic Communication According to DP/V1

5.5.1 2 DI I/O Modules

Index	Meaning	Service Primitives / Data Length
'0010.0000'	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001'	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'1010.0000'	Input data module	MSAC1/2_Read / 1 byte

5.5.2 2 DI I/O Modules with 1 Bit Diagnostics per Channel

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0000.0001'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0010.0000'	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001'	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'1010.0000'	Input data module	MSAC1/2_Read / 1 byte

5.5.3 4 DI I/O Modules

Index	Meaning	Service Primitives / Data Length
'0010.0000'	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001'	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'0010.0010'	Input data channel 3	MSAC1/2_Read / 1 bit (byte)
'0010.0011'	Input data channel 4	MSAC1/2_Read / 1 bit (byte)
'1010.0000'	Input data module	MSAC1/2_Read / 1 byte

5.5.4 8 DI I/O Modules

Index	Meaning	Service Primitives / Data Length
'0010.0000'	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001'	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'0010.0010'	Input data channel 3	MSAC1/2_Read / 1 bit (byte)
'0010.0011'	Input data channel 4	MSAC1/2_Read / 1 bit (byte)
'0010.0100'	Input data channel 5	MSAC1/2_Read / 1 bit (byte)
'0010.0101'	Input data channel 6	MSAC1/2_Read / 1 bit (byte)
'0010.0110'	Input data channel 7	MSAC1/2_Read / 1 bit (byte)
'0010.0111'	Input data channel 8	MSAC1/2_Read / 1 bit (byte)
'1010.0000'	Input data module	MSAC1/2_Read / 1 byte

5.5.5 16 DI I/O Modules

Index	Meaning	Service Primitives / Data Length
'0010.0000'	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001'	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'0010.0010'	Input data channel 3	MSAC1/2_Read / 1 bit (byte)
'0010.0011'	Input data channel 4	MSAC1/2_Read / 1 bit (byte)
'0010.0100'	Input data channel 5	MSAC1/2_Read / 1 bit (byte)
'0010.0101'	Input data channel 6	MSAC1/2_Read / 1 bit (byte)
'0010.0110'	Input data channel 7	MSAC1/2_Read / 1 bit (byte)
'0010.0111'	Input data channel 8	MSAC1/2_Read / 1 bit (byte)
'0010.0000'	Input data channel 9	MSAC1/2_Read / 1 bit (byte)
'0010.0001'	Input data channel 10	MSAC1/2_Read / 1 bit (byte)
'0010.0010'	Input data channel 11	MSAC1/2_Read / 1 bit (byte)
'0010.0011'	Input data channel 12	MSAC1/2_Read / 1 bit (byte)
'0010.0100'	Input data channel 13	MSAC1/2_Read / 1 bit (byte)
'0010.0101'	Input data channel 14	MSAC1/2_Read / 1 bit (byte)
'0010.0110'	Input data channel 15	MSAC1/2_Read / 1 bit (byte)
'0010.0111'	Input data channel 16	MSAC1/2_Read / 1 bit (byte)
'1010.0000'	Input data module	MSAC1/2_Read / 2 byte

5.5.6 2 DO I/O Modules

Index	Meaning	Service Primitives / Data Length
'0100.0000'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0001'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'1100.0000'	Output data module	MSAC1/2_Read, MSAC2_Write / 1 byte

5.5.7 2 DO I/O Modules with 1 or 2 Bit Diagnostics per Channel

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Diagnostics data channel 1	MSAC1/2_Read / 2 bytes
'0000.0001'	Diagnostics data channel 2	MSAC1/2_Read / 2 bytes
'0010.0000' *)	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001' *)	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'0100.0000'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0001'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'1010.0000' *)	Input data module	MSAC1/2_Read / 1 byte
'1100.0000'	Output data module	MSAC1/2_Read, MSAC2_Write / 1 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.8 4 DO I/O Modules

Index	Meaning	Service Primitives / Data Length
'0100.0000'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0001'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0010'	Output data channel 3	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0011'	Output data channel 4	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'1100.0000'	Output data module	MSAC1/2_Read, MSAC2_Write / 1 byte

5.5.9 4 DO I/O Modules with 1 Bit Diagnostics per Channel

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0000.0001'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0000.0010'	Diagnostics data channel 3	MSAC1/2_Read / 2 byte
'0000.0011'	Diagnostics data channel 4	MSAC1/2_Read / 2 byte
'0010.0000' *)	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001' *)	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'0010.0010' *)	Input data channel 3	MSAC1/2_Read / 1 bit (byte)
'0010.0011' *)	Input data channel 4	MSAC1/2_Read / 1 bit (byte)
'0100.0000'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0001'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0010'	Output data channel 3	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0011'	Output data channel 4	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'1010.0000' *)	Input data module	MSAC1/2_Read / 1 byte
'1100.0000'	Output data module	MSAC1/2_Read, MSAC2_Write / 1 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.10 8 DO I/O Modules

Index	Meaning	Service Primitives / Data Length
'0100.0000'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0001'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0010'	Output data channel 3	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0011'	Output data channel 4	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0100'	Output data channel 5	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0101'	Output data channel 6	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0110'	Output data channel 7	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0111'	Output data channel 8	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'1100.0000'	Output data module	MSAC1/2_Read, MSAC2_Write / 1 byte

5.5.11 8 DO I/O Modules with 1 Bit Diagnostics per Channel

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0000.0001'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0000.0010'	Diagnostics data channel 3	MSAC1/2_Read / 2 byte
'0000.0011'	Diagnostics data channel 4	MSAC1/2_Read / 2 byte
'0000.0100'	Diagnostics data channel 5	MSAC1/2_Read / 2 byte
'0000.0101'	Diagnostics data channel 6	MSAC1/2_Read / 2 byte
'0000.0110'	Diagnostics data channel 7	MSAC1/2_Read / 2 byte
'0000.0111'	Diagnostics data channel 8	MSAC1/2_Read / 2 byte
'0010.0000' *)	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001' *)	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'0010.0010' *)	Input data channel 3	MSAC1/2_Read / 1 bit (byte)
'0010.0011' *)	Input data channel 4	MSAC1/2_Read / 1 bit (byte)
'0010.0100' *)	Input data channel 5	MSAC1/2_Read / 1 bit (byte)
'0010.0101' *)	Input data channel 6	MSAC1/2_Read / 1 bit (byte)
'0010.0110' *)	Input data channel 7	MSAC1/2_Read / 1 bit (byte)
'0010.0111' *)	Input data channel 8	MSAC1/2_Read / 1 bit (byte)
'0100.0000'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0001'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0010'	Output data channel 3	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0011'	Output data channel 4	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0100'	Output data channel 5	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0101'	Output data channel 6	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0110'	Output data channel 7	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0111'	Output data channel 8	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'1010.0000' *)	Input data module	MSAC1/2_Read / 1 byte
'1100.0000'	Output data module	MSAC1/2_Read, MSAC2_Write / 1 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.12 16 DO I/O Modules

Index	Meaning	Service Primitives / Data Length
'0100.0000'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0001'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0010'	Output data channel 3	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0011'	Output data channel 4	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0100'	Output data channel 5	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0101'	Output data channel 6	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0110'	Output data channel 7	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.0111'	Output data channel 8	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.1000'	Output data channel 9	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.1001'	Output data channel 10	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.1010'	Output data channel 11	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.1011'	Output data channel 12	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.1100'	Output data channel 13	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.1101'	Output data channel 14	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.1110'	Output data channel 15	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'0100.1111'	Output data channel 16	MSAC1/2_Read, MSAC2_Write / 1 bit (byte)
'1100.0000'	Output data module	MSAC1/2_Read, MSAC2_Write / 1 byte

5.5.13 2 DI/DO I/O Modules with 1 Bit Diagnostics per Channel

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0000.0001'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0010.0000'	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001'	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'0010.0010' *)	Input data channel 3	MSAC1/2_Read / 1 bit (byte)
'0010.0011' *)	Input data channel 4	MSAC1/2_Read / 1 bit (byte)
'0100.0000'	Output data channel 1	MSAC1/2_Read, MSAC1/2_Write / 1 bit (byte)
'0100.0001'	Output data channel 2	MSAC1/2_Read, MSAC1/2_Write / 1 bit (byte)
'1010.0000'	Input data module	MSAC1/2_Read / 1 byte
'1100.0000'	Output data module	MSAC1/2_Read, MSAC1/2_Write / 1 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.14 Supply Module with Diagnostics

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Diagnostics data	MSAC1/2_Read / 2 byte
'0010.0000' *)	Input data channel 1	MSAC1/2_Read / 1 bit (byte)
'0010.0001' *)	Input data channel 2	MSAC1/2_Read / 1 bit (byte)
'1010.0000' *)	Input data module	MSAC1/2_Read / 1 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.15 2 AI I/O Modules

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 2 byte
'0011.1110' *)	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 2 byte
'0100.0000'	Table 1 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0100.0001'	Table 1 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0111.1010'	Table 1 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1011'	Table 1 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1100'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0111.1101'	Input data channel 2	MSAC1/2_Read / 2 byte
'0111.1110' *)	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 2 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.16 4 AI I/O Modules

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 2 byte
'0011.1110' *)	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 2 byte
'0100.0000'	Table 1 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0100.0001'	Table 1 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0111.1010'	Table 1 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1011'	Table 1 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1100'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0111.1101'	Input data channel 2	MSAC1/2_Read / 2 byte
'0111.1110' *)	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 2 byte
'1000.0000'	Table 2 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1000.0001'	Table 2 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'1011.1010'	Table 2 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1011.1011'	Table 2 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1011.1100'	Diagnostics data channel 3	MSAC1/2_Read / 2 byte
'1011.1101'	Input data channel 3	MSAC1/2_Read / 2 byte
'1011.1110' *)	Output data channel 3	MSAC1/2_Read, MSAC2_Write / 2 byte
'1100.0000'	Table 3 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte

Index	Meaning	Service Primitives / Data Length
'1100.0001'	Table 3 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'1111.1010'	Table 3 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1111.1011'	Table 3 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1111.1100'	Diagnostics data channel 4	MSAC1/2_Read / 2 byte
'1111.1101'	Input data channel 4	MSAC1/2_Read / 2 byte
'1111.1110' *)	Output data channel 4	MSAC1/2_Read, MSAC1/2_Write / 2 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.17 2 AO I/O Modules

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101' *)	Input data channel 1	MSAC1/2_Read
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 2 byte
'0100.0000'	Table 1 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0100.0001'	Table 1 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0111.1010'	Table 1 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1011'	Table 1 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1100'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0111.1101' *)	Input data channel 2	MSAC1/2_Read
'0111.1110'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 2 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.18 4 AO I/O Modules

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101' *)	Input data channel 1	MSAC1/2_Read
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 2 byte
'0100.0000'	Table 1 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0100.0001'	Table 1 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0111.1010'	Table 1 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1011'	Table 1 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1100'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0111.1101' *)	Input data channel 2	MSAC1/2_Read
'0111.1110'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 2 byte
'1000.0000'	Table 2 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1000.0001'	Table 2 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'1011.1010'	Table 2 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1011.1011'	Table 2 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1011.1100'	Diagnostics data channel 3	MSAC1/2_Read / 2 byte
'1011.1101' *)	Input data channel 3	MSAC1/2_Read
'1011.1110'	Output data channel 3	MSAC1/2_Read, MSAC2_Write / 2 byte
'1100.0000'	Table 3 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte

Index	Meaning	Service Primitives / Data Length
'1100.0001'	Table 3 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'1111.1010'	Table 3 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1111.1011'	Table 3 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'1111.1100'	Diagnostics data channel 3	MSAC1/2_Read / 2 byte
'1111.1101' *)	Input data channel 3	MSAC1/2_Read
'1111.1110'	Output data channel 3	MSAC1/2_Read, MSAC2_Write / 2 byte

*) These indices are only available when the mapping of diagnostics data into the input process image is enabled

5.5.19 Counter Module 750-404

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 6 byte
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 6 byte

5.5.20 Counter Module 750-638 and PWM Module 750-511

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 3 byte
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 3 byte
'0100.0000'	Table 1 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0100.0001'	Table 1 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0111.1010'	Table 1 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1011'	Table 1 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0111.1100'	Diagnostics data channel 2	MSAC1/2_Read / 2 byte
'0111.1101'	Input data channel 2	MSAC1/2_Read / 3 byte
'0111.1110'	Output data channel 2	MSAC1/2_Read, MSAC2_Write / 3 byte

5.5.21 SSI Interface

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 4 byte
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 4 byte

5.5.22 Incremental Encoder Interfaces and Serial Interfaces

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 6 byte
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 6 byte

5.5.23 Digital Impulse Interface

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 4 byte
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 4 byte

5.5.24 Serial Interfaces and Data Exchange Module

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 4 or 6 byte
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 4 or 6 byte

5.5.25 DALI/DSI Master

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 6 byte
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 6 byte

5.5.26 AS Interface Master

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / n byte (n ∈ {12, 20, 24, 32, 40, 48})
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / n byte (n ∈ {12, 20, 24, 32, 40, 48})

5.5.27 *PROFIsafe* I/O Modules

Index	Meaning	Service Primitives / Data Length
'0000.0000'	Table 0 / register 0	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0000.0001'	Table 0 / register 1	MSAC1/2_Read, MSAC1/2_Write / 2 byte
...	...	...
'0011.1010'	Table 0 / register 58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1011'	Table 0 / register 0…58	MSAC1/2_Read, MSAC1/2_Write / 2 byte
'0011.1100'	Diagnostics data channel 1	MSAC1/2_Read / 2 byte
'0011.1101'	Input data channel 1	MSAC1/2_Read / 5 Byte (Assignment fieldbus) MSAC1/2_Read / 8 Byte (Assignment PFC)
'0011.1110'	Output data channel 1	MSAC1/2_Read, MSAC2_Write / 5 Byte (Assignment Feldbus) MSAC1/2_Read, MSAC2_Write / 8 Byte (Assignment PFC)

6 Use in Hazardous Environments

6.1 Foreword

Today's development shows that many chemical and petrochemical companies have production plants, production, and process automation machines in operation which use gas-air, vapor-air and dust-air mixtures which can be explosive. For this reason, the electrical components used in such plants and systems must not pose a risk of explosion resulting in injury to persons or damage to property. This is backed by law, directives or regulations on a national and international scale. WAGO-I/O-SYSTEM 750 (electrical components) is designed for use in zone 2 explosive environments. The following basic explosion protection related terms have been defined.

6.2 Protective Measures

Primarily, explosion protection describes how to prevent the formation of an explosive atmosphere. For instance by avoiding the use of combustible liquids, reducing the concentration levels, ventilation measures, to name but a few. But there are a large number of applications, which do not allow the implementation of primary protection measures. In such cases, the secondary explosion protection comes into play. Following is a detailed description of such secondary measures.

6.3 Classification Meeting CENELEC and IEC

The specifications outlined here are valid for use in Europe and are based on the following standards: EN50... of CENELEC (European Committee for Electrotechnical Standardization). On an international scale, these are reflected by the IEC 60079-... standards of the IEC (International Electrotechnical Commission).

6.3.1 Divisions

Explosive environments are areas in which the atmosphere can potentially become explosive. The term explosive means a special mixture of ignitable substances existing in the form of air-borne gases, fumes, mist or dust under atmospheric conditions which, when heated beyond a tolerable temperature or subjected to an electric arc or sparks, can produce explosions. Explosive zones have been created to describe the concentrations level of an explosive atmosphere. This division, based on the probability of an explosion occurring, is of great importance both for technical safety and feasibility reasons. Knowing that the demands placed on electrical components permanently employed in an explosive environment have to be much more stringent than those placed on electrical components that are only rarely and, if at all, for short periods, subject to a dangerous explosive environment.

Explosive areas resulting from gases, fumes or mist:

- Zone 0 areas are subject to an explosive atmosphere (> 1000 h /year) continuously or for extended periods.
- Zone 1 areas can expect the occasional occurrence of an explosive atmosphere (> 10 h ≤ 1000 h /year).
- Zone 2 areas can expect the rare or short-term occurrence of an explosive atmosphere (> 0 h ≤ 10 h /year).

Explosive areas subject to air-borne dust:

- Zone 20 areas are subject to an explosive atmosphere (> 1000 h /year) continuously or for extended periods.
- Zone 21 areas can expect the occasional occurrence of an explosive atmosphere (> 10 h ≤ 1000 h /year).
- Zone 22 areas can expect the rare or short-term occurrence of an explosive atmosphere (> 0 h ≤ 10 h /year).

6.3.2 Explosion Protection Group

In addition, the electrical components for explosive areas are subdivided into two groups:

Group I: Group I includes electrical components for use in fire-damp endangered mine structures.

Group II: Group II includes electrical components for use in all other explosive environments. This group is further subdivided by pertinent combustible gases in the environment. Subdivision IIA, IIB and IIC takes into account that different materials/substances/gases have various ignition energy characteristic values. For this reason the three sub-groups are assigned representative types of gases:

IIA – Propane
IIB – Ethylene
IIC – Hydrogen

Tab. 6-1: Minimal ignition energy of representative types of gases

Minimal Ignition Energy of Representative Types of Gases				
Explosion group	I	IIA	IIB	IIC
Gases	Methane	Propane	Ethylene	Hydrogen
Ignition energy (µJ)	280	250	82	16

Hydrogen being commonly encountered in chemical plants, frequently the explosion group IIC is requested for maximum safety.

6.3.3 Unit Categories

Moreover, the areas of use (zones) and the conditions of use (explosion groups) are subdivided into categories for the electrical operating means:

Tab. 6-2: Unit categories

Unit category	Explosion group	Area of use
M1	I	Fire-damp protection
M2	I	Fire-damp protection
1G	II	Zone 0 Explosive environment by gas, fumes or mist
2G	II	Zone 1 Explosive environment by gas, fumes or mist
3G	II	Zone 2 Explosive environment by gas, fumes or mist
1D	II	Zone 20 Explosive environment by dust
2D	II	Zone 21 Explosive environment by dust
3D	II	Zone 22 Explosive environment by dust

6.3.4 Temperature Classes

The maximum surface temperature for electrical components of explosion protection group I is 150 °C (danger due to coal dust deposits) or 450 °C (if there is no danger of coal dust deposit).

In line with the maximum surface temperature for all ignition protection types, the electrical components are subdivided into temperature classes, as far as electrical components of explosion protection group II are concerned. Here the temperatures refer to a surrounding temperature of 40 °C for operation and testing of the electrical components. The lowest ignition temperature of the existing explosive atmosphere must be higher than the maximum surface temperature.

Tab. 6-3: Temperature classes

Temperature Classes	Maximum Surface Temperature	Ignition Temperature of the Combustible Materials
T1	450 °C	> 450 °C
T2	300 °C	> 300 °C to 450 °C
T3	200 °C	> 200 °C to 300 °C
T4	135 °C	> 135 °C to 200 °C
T5	100 °C	>100 °C to 135 °C
T6	85°C	> 85 °C to 100 °C

The following table represents the division and attributes of the materials to the temperature classes and material groups in percent:

Tab. 6-4: Material groups in percent

Temperature classes						
T1	T2	T3	T4	T5	T6	Total*
26.6 %	42.8 %	25.5 %				
94.9 %			4.9 %	0 %	0.2 %	432
Explosion group						
IIA	IIB	IIC				Total*
85.2 %	13.8 %	1.0 %				501

* Number of classified materials

6.3.5 Types of Ignition Protection

Ignition protection defines the special measures to be taken for electrical components in order to prevent the ignition of surrounding explosive atmospheres. For this reason a differentiation is made between the following types of ignition protection:

Tab. 6-5: Types of Ignition Protection

Identifi-cation	CENELEC standard	IEC standard	Explanation	Application
EEx o	EN 50 015	IEC 79-6	Oil encapsulation	Zone 1 + 2
EEx p	EN 50 016	IEC 79-2	Overpressure encapsulation	Zone 1 + 2
EEx q	EN 50 017	IEC 79-5	Sand encapsulation	Zone 1 + 2
EEx d	EN 50 018	IEC 79-1	Pressure resistant encapsulation	Zone 1 + 2
EEx e	EN 50 019	IEC 79-7	Increased safety	Zone 1 + 2
EEx m	EN 50 028	IEC 79-18	Cast encapsulation	Zone 1 + 2
EEx i	EN 50 020 (unit) EN 50 039 (system)	IEC 79-11	Intrinsic safety	Zone 0 + 1 + 2
EEx n	EN 50 021	IEC 79-15	Electrical components for zone 2 (see below)	Zone 2

Ignition protection “n" describes exclusively the use of explosion protected electrical components in zone 2. This zone encompasses areas where explosive atmospheres can only be expected to occur rarely or short-term. It represents the transition between the area of zone 1, which requires an explosion protection and safe area in which for instance welding is allowed at any time.

Regulations covering these electrical components are being prepared on a world-wide scale. The standard EN 50 021 allows electrical component manufacturers to obtain certificates from the corresponding authorities for instance KEMA in the Netherlands or the PTB in Germany, certifying that the tested components meet the above mentioned standards draft.

Type “n” ignition protection additionally requires electrical components to be marked with the following extended identification:

- A – non spark generating (function modules without relay /without switches)
- AC – spark generating, contacts protected by seals (function modules with relays / without switches)
- L – limited energy (function modules with switch)

Additional Information
For more detailed information please refer to the national and/or international standards, directives and regulations!

6.4 Classifications Meeting the NEC 500

The following classifications according to NEC 500 (National Electric Code) are valid for North America.

6.4.1 Divisions

The "Divisions" describe the degree of probability of whatever type of dangerous situation occurring. Here the following assignments apply:

Explosion endangered areas due to combustible gases, fumes, mist and dust:	
Division 1	Encompasses areas in which explosive atmospheres are to be expected occasionally (> 10 h ≤ 1000 h /year) as well as continuously and long-term (> 1000 h /year).
Division 2	Encompasses areas in which explosive atmospheres can be expected rarely and short-term (>0 h ≤ 10 h /year).

6.4.2 Explosion Protection Groups

Electrical components for explosion endangered areas are subdivided in three danger categories:

Class I (gases and fumes):	Group A (Acetylene) Group B (Hydrogen) Group C (Ethylene) Group D (Methane)
Class II (dust):	Group E (Metal dust) Group F (Coal dust) Group G (Flour, starch and cereal dust)
Class III (fibers):	No sub-groups

6.4.3 Temperature Classes

Electrical components for explosive areas are differentiated by temperature classes:

Temperature classes	Maximum surface temperature	Ignition temperature of the combustible materials
T1	450 °C	> 450 °C
T2	300 °C	> 300 °C to 450 °C
T2A	280 °C	> 280 °C to 300 °C
T2B	260 °C	> 260 °C to 280 °C
T2C	230 °C	>230 °C to 260 °C
T2D	215 °C	>215 °C to 230 °C
T3	200 °C	>200 °C to 215 °C
T3A	180 °C	>180 °C to 200 °C
T3B	165 °C	>165 °C to 180 °C
T3C	160 °C	>160 °C to 165 °C
T4	135 °C	>135 °C to 160 °C
T4A	120 °C	>120 °C to 135 °C
T5	100 °C	>100 °C to 120 °C
T6	85 °C	> 85 °C to 100 °C

6.5 Identification

6.5.1 For Europe

According to CENELEC and IEC

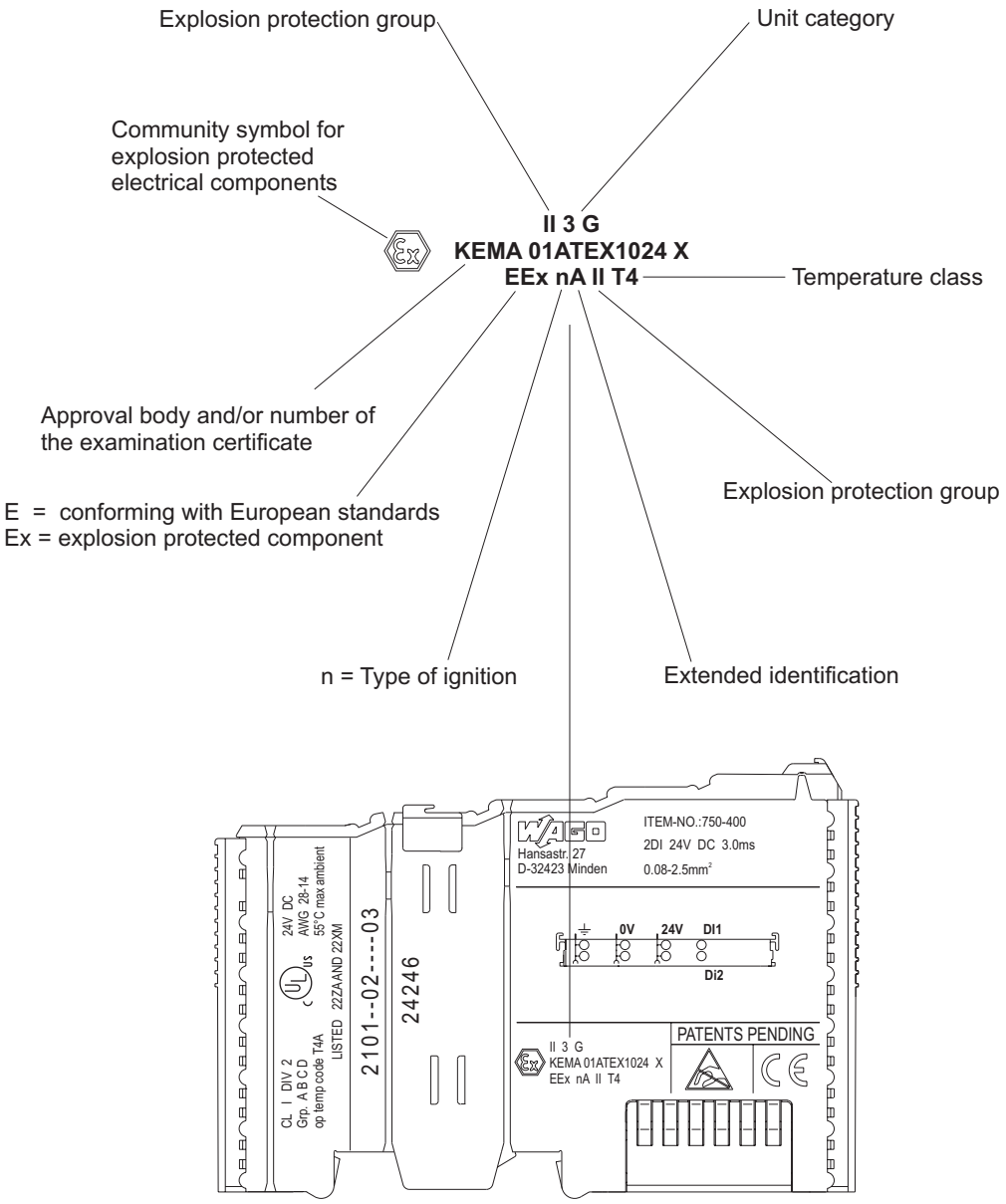


Fig. 6-1: Example for lateral labeling of bus modules
(750-400, 2 channel digital input module 24 V DC)

g01xx03e

6.5.2 For America

According to NEC 500

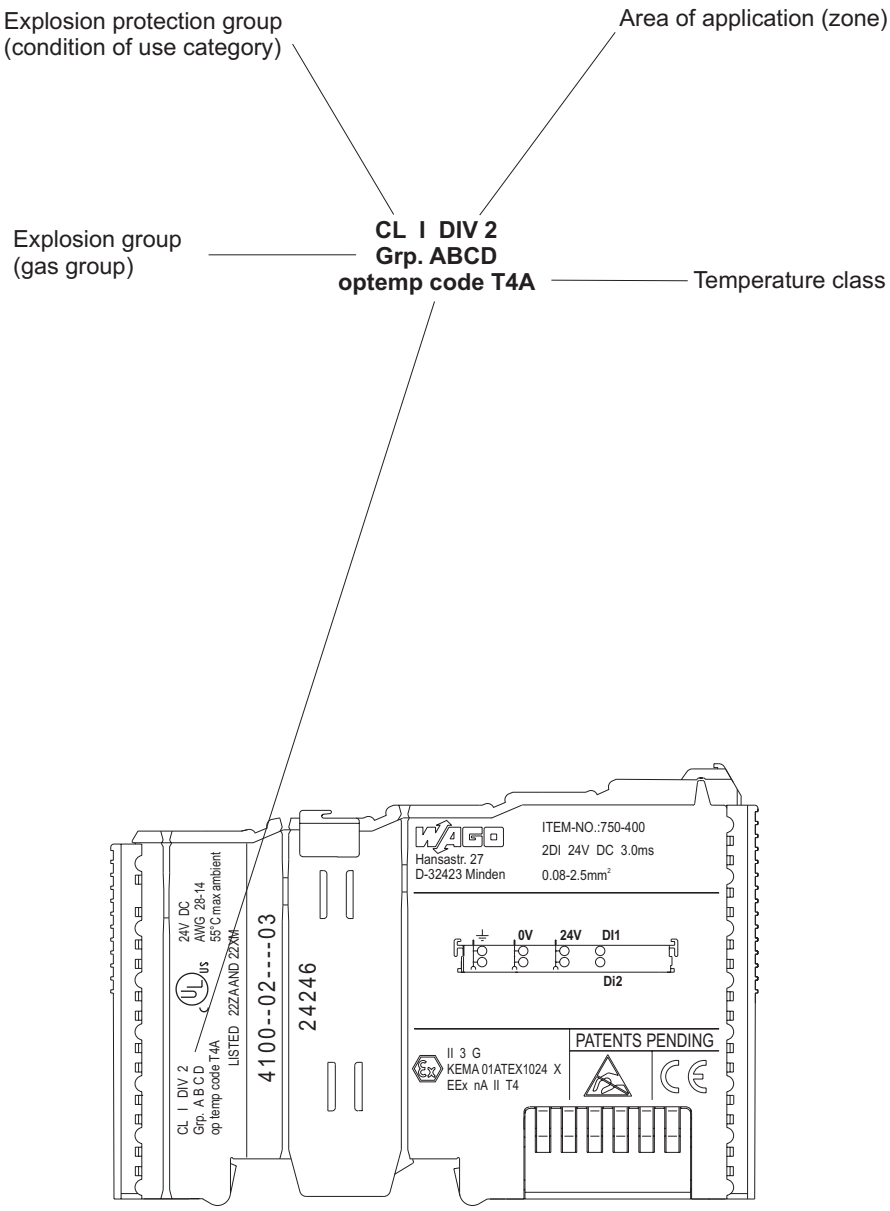


Fig. 6.5.2-1: Example for lateral labeling of bus modules
(750-400, 2 channel digital input module 24 V DC)

g01xx04e

6.6 Installation Regulations

In the **Federal Republic of Germany,** various national regulations for the installation in explosive areas must be taken into consideration. The basis being the ElexV complemented by the installation regulation DIN VDE 0165/2.91. The following are excerpts from additional VDE regulations:

DIN VDE 0100	Installation in power plants with rated voltages up to 1000 V
DIN VDE 0101	Installation in power plants with rated voltages above 1 kV
DIN VDE 0800	Installation and operation in telecommunication plants including information processing equipment
DIN VDE 0185	lightning protection systems

The **USA** and **Canada** have their own regulations. The following are excerpts from these regulations:

NFPA 70	National Electrical Code Art. 500 Hazardous Locations
ANSI/ISA-RP 12.6-1987	Recommended Practice
C22.1	Canadian Electrical Code

Danger
When using the WAGO-I/O SYSTEM 750 (electrical operation) with Ex approval, the following points are mandatory:

The field bus independent I/O System Modules Type 750-xxx are to be installed in enclosures that provide for the degree of ingress protection of at least IP54.
For use in the presence of combustible dust, the above mentioned modules are to be installed in enclosures that provide for the degree of ingress protection of at least IP64.

The field bus independent I/O system may only be installed in hazardous areas (Europe: Group II, Zone 2 or America: Class I, Division 2, Group A, B, C, D) or in non-hazardous areas!

Installation, connection, addition, removal or replacement of modules, field bus connectors or fuses may only take place when the system supply and the field supply are switched off, or when the area is known to be non-hazardous.

Ensure that only approved modules of the electrical operating type will be used. The Substitution or Replacement of modules can jeopardize the suitability of the system in hazardous environments!

Operation of intrinsically safe EEx i modules with direct connection to sensors/actuators in hazardous areas of Zone 0 + 1 and Division 1 type requires the use of a 24 V DC Power Supply EEx i module!

DIP switches and potentiometers are only to be adjusted when the area is known to be non-hazardous.

Additional Information
Proof of certification is available on request.
Also take note of the information given on the module technical information sheet.

7 List of Literature

Further Information
The PNO provides further documentation for its members on internet. Cable specification information can be obtained from, for example, the "Technical Guideline 2.111, Installation Guidelines for PROFIBUS DP/FMS".

http://www.profibus.com/

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